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Suggestions from industry representatives concerning possible topics for future issues are welcomed and should be forwarded to the Editor at the address shown below.

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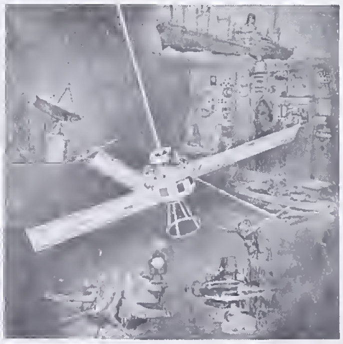
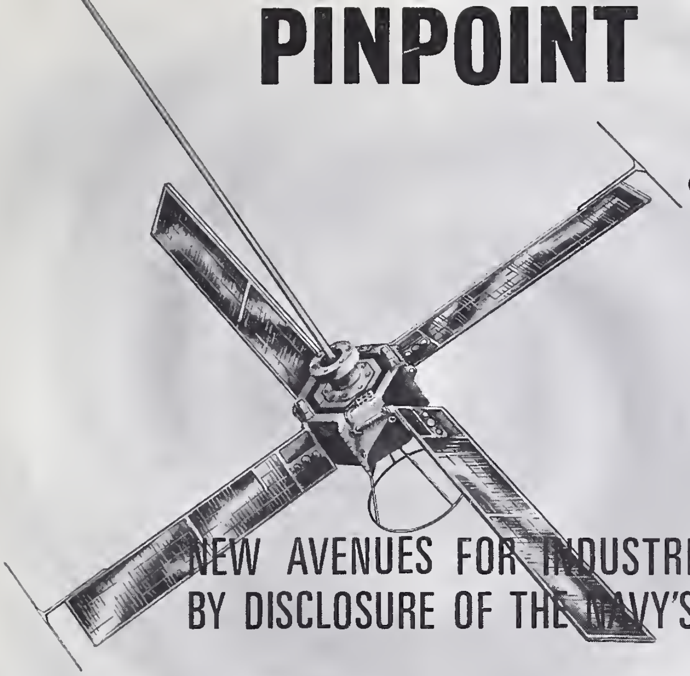


Artist's concept of the many applications of the Navy's Navigation Satellite. Article begins on page 1.

PINPOINT NAVIGATION ..By Satellite



NEW AVENUES FOR INDUSTRIAL EXPANSION ARE REVEALED BY DISCLOSURE OF THE NAVY'S NAVIGATION SATELLITE SYSTEM

A man-made star races around Earth at five miles a second. Its body is an octagonal drum. Four blades, inlaid with a mosaic of photoelectric cells, gather energy from the sun. A 100-foot ribbon of metal alloy extends upward from its deck to keep a transmitting antenna on its base pointing at Earth, 600 miles below. Its payload, the size of a large hatbox, is crammed full of circuitry, memory banks, oscillators, storage batteries, receiving, transmitting apparatus. Through the modern miracle of microminiaturization, a Navy Navigation Satellite containing 34,000 components weighs less than 130 pounds.

For every pound of satellite in orbit, there are tons of supporting equipment on earth—receiving, computing, timing, telemetry and transmitting gear—all operated by men of the Navy Astronautics Group, who manage this utilitarian family of navigation satellites and keep each one of them supplied with information destined for Navy users around the world. The network command post is located at Point Mugu, Calif., on the grounds of the Pacific Missile Range. Other stations are situated in Maine, Minnesota and Hawaii. They track each passing satellite electronically and relay their observations of its orbital course to a central computer complex at headquarters. Exact predictions where each satellite will be in orbit at two-minute intervals throughout the day ahead are computed from these up-to-date reports; when broadcast from a satellite, they will define its orbital whereabouts as it circles the globe. These predictions are timed to come true the instant they are received on Earth. If you know a satellite's orbit, a measure of the frequency change versus time in signals received from the passing satellite can be used to pinpoint your position on Earth. Any place on Earth revolves within range of a single polar-orbiting satellite at least twice a day. The Earth revolves beneath the plane of such a satellite about 27 degrees of longitude per 108-minute orbit, or approximately the longitudinal difference between Minneapolis and Los Angeles. The system will work with one satellite, but more have been added to meet operating requirements of the Fleet.

Satellites in orbit, network equipment that operates them, navigation sets aboard ships that use them—these are the basic elements of the Navy Navigation Satellite System.

They are also elements of interest to defense contractors who manufacture electrical and electronic equipment. The ground system alone represents an initial investment of $14.5 million, with an annual upkeep that amounts to $4 million. The design concept followed from the beginning has been that the system should represent an ingenious association of shelf-items wherever possible, with in-house engineering of special purpose hardware confined to those items for which there is no commercial counterpart. Without compiling an otherwise useless statistic, it is safe to say that 90 percent of the System is made up of hardware built by defense contractors and over-the-counter items produced by commercial manufacturers.

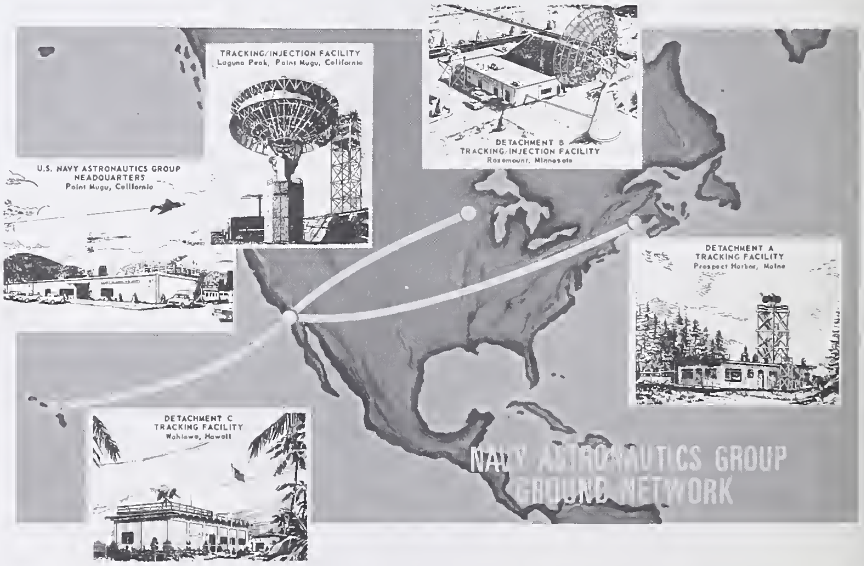
Add to this the impetus given the electronics industry last year by Vice President Humphrey's disclosure of our government's intent to authorize commercial manufacture of shipboard receiving equipment to utilize information broadcast by the navigation satellites. As Chairman of the National Council for Marine Resources and Engineering Development, he announced that this equipment would be cleared for sale to U.S. civilian shipping. A policy regulating sale of this equipment to our closely allied nations is under consideration.

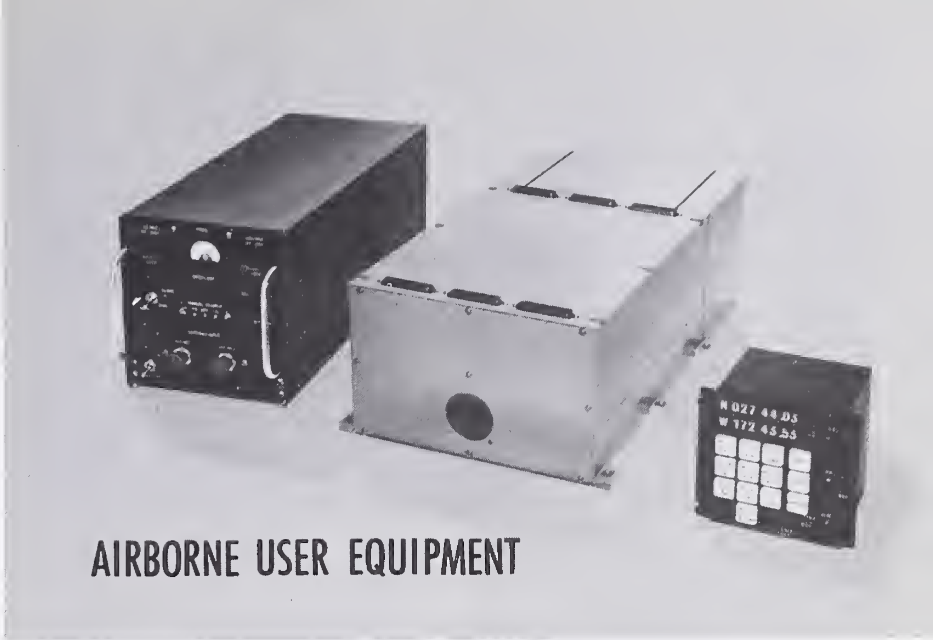
In his announcement, the Vice President cited "an increasing interest in this system by the industrial community, offshore oil exploration companies, and other segments of U.S. industry interested in the commercial applications of this system for ships requiring accurate navigation," as influencing the decision to release for non-military use commercially produced versions of satellite navigation sets in the interests of industrial development.

Vice President Humphrey concluded this announcement of the clearance of the Navy Navigation Satellite System, noting that "The Navy will shortly provide the National Security Industrial Association with the necessary technical information and documentation concerning shipboard user equipment (the navigation sets) which would be available for use on an equal basis by any interested U.S. party." This has been done.

The immediate and long-range effects of this disclosure upon our industrial economy will be discussed in this article. The flood of inquiries from scientific and industrial research organizations triggered by this announcement indicates that a ready market awaits production of user equipment. Manufacture of commercial receivers is underway at ITT Aerospace and Magnavox Co. We are advised that, eventually, commercially made shipboard receivers will be placed on the market at a price between $5,000 and $10,000. Almost any standard computer can be programmed to work with them; ITT will offer a 6 by 6 by 15-inch low-cost computer specifically designed to fit the receiver chassis as an ensemble navigation set.

The navigation satellite continuously broadcasts signals modulated with data letting users know which satellite it is, what time it is according to the satellite "clock," and exactly where in space the satellite is right now. Aboard ship, a navigation set measures the frequency change in incoming signals at the same time that it is receiving and decoding the data broadcasts. It equates the two, to print out an "instant fix."





AIRBORNE USER EQUIPMENT

Although commercially produced shipboard user equipments are bound to differ superficially according to the design of each individual manufacturer, basically each will contain:

- Radio receivers capable of acquiring both signal frequencies generated by navigation satellites.
- Corrective devices that calculate and cancel ionospheric refraction effects (bending that occurs whenever radio signals pass through the surrounding layer of ionosphere enroute to Earth).
- A cycle-counter and stable time-standard that measure changes in frequency (doppler shift) at precise intervals, typically apparent during reception of signals from a passing satellite.
- Decoding equipment that translates a portion of the navigation data being broadcast from the satellite (superimposed as phase-modulation upon incoming carrier signals).
- A computer that stores incoming doppler count and navigation data, programmed to equate the two and print out latitude, longitude and satellite time.

Navigation by satellite—how does it work? At least three of the two-minute intervals, into which satellite broadcasts are divided, are required by commercial user equipment to calculate a position fix. Orbital parameters broadcast by the satellite, defining that portion of the orbit which corresponds to doppler counts received, are used to compute successive hyperboloids of revolution. The point on Earth, where these hyperbolic cones intersect, is the ship's position.

A ship does not sail its charted course down a line drawn with a ruler, but it does do so as closely as possible through dead reckoning. Conventionally, the navigator adds logged speed, compass bearings and educated guesswork about external forces affecting the ship's passage to his most recent celestial observations. Whenever he can, he checks his assumed position by sextant at sunrise, sunset, or high noon, and the ship's heading is altered slightly from day to day to return to its charted course. Weather conditions limit chances to "shoot" the noonday sun or the stars at dawn or dusk, and certain knowledge of the ship's true position is often forced to wait until the next clear day. Night or day, anywhere on Earth, in any kind of weather, navigation satellite signals are ready to supply a far more accurate fix than can be obtained from celestial observations, even under ideal conditions.

Navigation by satellite does not supplant any of the navigation systems presently in use. It is not a navigation system in the full sense of the word. What it does is provide the most accurate, reliable way yet known to fix your position. It is more properly defined as a positioning system that is readily available as a navigational aid to provide precise reference points required periodically to zero out accumulated errors inherent in any dead reckoning navigation system. It represents a new departure in celestial navigation, using a man-made artificial satellite that takes an active part in the navigation process—a "radio star" which may be observed electronically under any conditions. So far as the user is concerned, this position referencing system is passive, requiring no transmission on his part.

Commercial uses of the system will benefit some industries directly; others will experience long-range expansion from achievement of scientific goals that will open broad fields for industrial development of new processes and products. Industries will be formed that do not exist today.

Some segments of American industry regard the Navy Navigation Satellite System primarily as a navigation aid; other segments are chiefly interested in it as a positioning system.

For instance, merchant shipping will obviously benefit from its use as a navigation aid, enabling precise position determination under adverse weather conditions.

As an example of its use primarily as a positioning system, the precise reference points contributed by navigation satellites for fixing the location of an oil-drilling site at sea are right down the oil industry's alley. Translocation is a particularly useful technique to establish such an offshore site. This method positions survey ships in relation to a "surveyed-in" shore station—separate receivers are operated aboard ships and ashore, independently and simultaneously in view of a passing satellite. A single computer is maintained at the shore station. This receiver partnership obviates many user error possibilities in the use of satellites for navigation.

Colocation is another useful technique in which a satellite receiver and another navigation receiver, such as Loran or Omega, are physically located in the same place or vessel. By taking simultaneous fixes from each receiver, an error or bias can be determined. Because the bias remains essentially constant between satellite passes, an economical high accuracy continuous navigation system is available using the colocation technique.

"Navigation-after-the-fact" is an interesting development along these lines as, for instance, when a receiver is activated aboard an oil-exploration ship to keep a mnemonic log of its travels, leaving it free to go about its business of collecting core samples without having to anchor to take a celestial fix whenever a sample is brought up. Each sample is labeled chronologically. Later, when the ship returns to base, the position at which each sampling was taken can be reconstructed from the ship's recorded satellite receptions by the shore computer, which has been operating closely enough to register the same broadcasts at the same times. In this instance, error factors due to ionospheric refraction are canceled since both receivers are affected equally. Makers of commercial satellite receiver sets are carrying as many back orders on their books today from major oil companies as from scientific research organizations.

This new position fixing technique has a practical counterpart usage in industrial exploration on land as well. Prospectors will be able to carry satellite receiving equipment into the back country. It will no longer be necessary for geologists, mineralogists, archaeologists, hydrologists, or engineering survey crews blazing a trail to painstakingly record physical landmark bearings to identify selected sites for work crews who will follow. They need only take note of the time at which they arrive at a likely location. By translocation, the computer at their base camp will keep a precise record of their search whenever they are in view of a satellite. The process will be passive on their part, and automatic.

The sea, Earth's last great frontier, covers 71 percent of the world's surface. A dark, cold, forbidding habitat, it is largely unexplored in depth and only primitively utilized, yet it will increasingly affect the daily lives of people throughout the world. It is rich in food and mineral resources.

The economic potential of the ocean is vast. The nation's oceanographic spending is now about $500 million annually and rising rapidly. Estimates are that by 1975 it will cost in the neighborhood of $5 billion for necessary underseas research, life-support studies and marine operations to keep our country in the forefront when it comes to tapping this great storehouse of natural resources. The Cachalot diving system permits man to live and work undersea for as long as a week. Deepstar-4000, the free-swimming, three-man research submersible, has completed over 100 dives to 4,000 feet.

This fall, Sealab III placed aquanauts in a working habitat 600 feet below the surface off San Clemente Island, Calif. They are performing everyday tasks like the deep sea salvage, oceanographic and bathyconstruction experiments that were conducted during the 1965 prolonged submergence of Sealab II, testing man's ability to live and work beneath the sea.

Being designed is Deepstar-20,000 for use at depths to nearly four miles. The Navy's Deep Submergence Search Vehicle (DSSV) will be the first of a sophisticated class of vessels capable of performing investigatory operations at 20,000 feet. An Arctic research drift vessel is under design for the National Science Foundation, housing 45 men, several years' food supply, laboratories, shops, medical and recreational facilities, aircraft and hangar, and a small nuclear reactor for atomic power.

What do the precise positioning references contributed by the Navy Navigation Satellite System mean to oceanography, cartography, or to any long-term survey situations such as these, where it is necessary to develop a continuum of scientific data concerning a locale or environment? It means you need only to go there with System equipment to fix your true position, or to return to it at any time you choose.

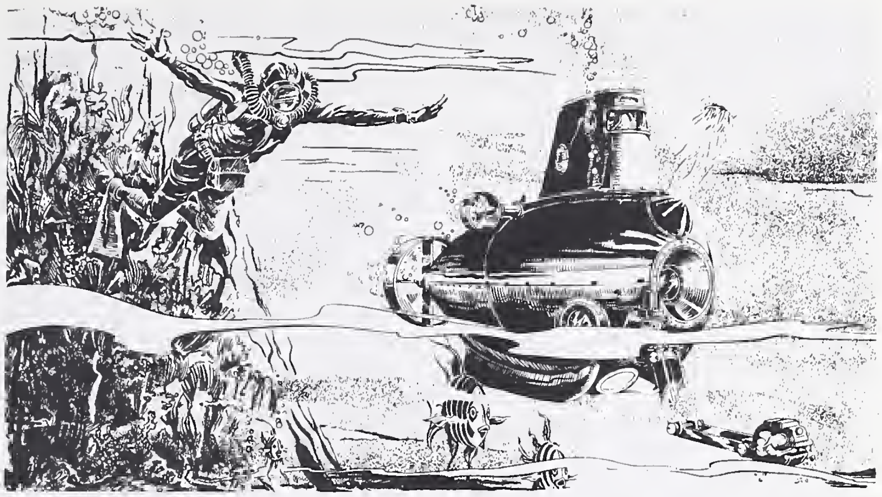
Geologists prospecting for offshore oil have not been blind to indications of the presence of other valuable minerals, metals and gems dredged up from the bottom of the seas. The technology for mining them is somewhat behind that of the oil industry, but not so far behind as are legal decisions toward establishing proprietary leasing rights to such claims.

The mere existence of this unexploited undersea wealth on the continental shelf means pressure exerted by industry which legislators cannot long ignore. Unless these decisions are reached carefully and definitively, with common accord and uniformity, a scramble of prospecting beneath the ocean floor could take place that would make the '49ers, the Alaskan sourdoughs, and the Sooners on the Cherokee Strip look like games of musical chairs. One thing the legislators having going for them now is that prospectors, using the Navy Navigation Satellite System, can stake a claim that can't be jumped.

As the ocean becomes an increasingly precious commodity, the so-called "freedom-of-the-seas" policy will be increasingly challenged. As technologies become progressively proficient at extracting treasure from the ocean deep, and as prolific populations continue to overrun agricultural areas on land and become more dependent upon the ocean's yield, some way must be worked out to draw up new agricultural and industrial frontiers at sea. This problem will confront coming generations, but the problem is no less real for being over the horizon, and its solution will almost certainly lie in setting up boundaries that will be fixed by satellite.

Before then, it is likely that agreements will be reached regulating industrial expansion seaward to a distance that will be compatible with developments in commercial fishing, mining and farming of the seas. This expansion will probably parallel our own frontier pattern so familiar to Americans, starting from scratch as wild country open to hunters and trappers—in this case, fishermen. The next step will be for the new territory to become open range for cattlemen, or their marine counterparts, professional cultivators and growers of seafood for markets ashore. Gradually, the littoral will be split up into the farms of hydroagronomists growing and harvesting algae, kelp, and like sea-vegetation containing great food values. They will group together near central supply depots, processing plants and factories to form settlements and communities which, in the Jules Verne world of tomorrow, may well merge into cities in the sea. The fences dividing these farms—the point at which Farmer Dowd's south forty ends and Fisherman Jenkins pasture begins—will probably be established by navigation satellites.

Recently, much has been said comparing our exploratory efforts in space with those of inner earth, particularly the ocean depths. There seems to be a general feeling that proportionately more of these efforts should be diverted toward the latter, in the light of scientific opinion that the time is not far off when the Earth's exploding population will become increasingly dependent upon the sea for subsistence. Such comparisons are not entirely valid. Each effort complements the other. Paradoxically, the computer-recorded behavior of navigation satellites in thousands of orbits in space is telling us more and more about the shape, inner distribution of mass and shifting crust of the Earth we live on, and about the forces that surround it. The orbital behavior of navigation satellites tends to confirm many modern conclusions that our "globe" is really oblate from some viewpoints, or pear-shaped with a dimple in the South Pacific and a pimple in the North Atlantic, depending on how you look at it. Every geodetic advance that further perfects our "model" of the Earth is incorporated in orbital computer programs to improve the accuracy of the Navigation Satellite System. The precise positioning provided by navigation satellities enables us to grid land mass, polar icecap, equatorial jungle, desert waste, Arctic morass, or the ocean floor and explore each of them systematically, taking up tomorrow where we leave off today.



So far, we have speculated in far-out terms about some downstream situations wherein pinpointing-by-satellite will enable development of new areas for industrial expansion. Let's narrow down to a closer look at the present state of the satellite art and what it means to industry.

Although it is the intent of this article to talk to industry about the effects upon our industrial economy of public disclosure of the Navy Navigation Satellite System and authorization for commercial production of satellite user equipment, there is one item of military development that is of such interest to defense contractors dealing in electronic hardware as to warrant inclusion here. To rebut the ironic popular comment, "If it works, it's obsolete!" in which there sometimes appears to be more truth than poetry, positioning-by-satellite capabilities are planned for many more surface ships of the line and type commands than presently carry navigation sets onboard. To date, only some of our attack carriers and cruisers have been equipped to use the Navy Navigation Satellite System. This fact constitutes reassurance to industry that the system will be operated by the Navy according to a basic satellite configuration that will remain unchanged, although we are only at a point in the Satellite Age roughly comparable to the first aircraft landings on the deck of the U.S.S. Langley.

To quote once more from Vice President Humphrey's address, "There is, of course, no commitment by the Navy to maintain the system indefinitely for non-military use. However, recognizing the need for strengthening our world-wide navigational capabilities, the Marine Sciences Council has requested the Department of Transportation to prepare a recommended plan for meeting future non-military navigational requirements with consideration given to the role of land-based radio systems and navigational satellites." Industry may be confident that commercial user equipment will continue to be compatible with navigation satellites for years to come.

Now, you can establish your position with certainty anywhere on Earth, confident that you will be able to return to that spot tomorrow, next month, or years from today. Marine research institutions have been quick to climb aboard, particularly those which specialize in extensive studies of underwater currents and underseas viewing techniques.

The Lamont Geological Observatory of Columbia University was permitted to fabricate four navigation satellite receivers in-house for their own use aboard research vessels and on ice islands in the Arctic Ocean. At the conclusion of these experiments, they wrote to the Assistant Secretary of the Navy for Research and Development, "We have had extensive experience with the Navy Navigation Satellite System and have found it extremely useful. It has introduced a new era for oceangoing research of all types, especially for oceanographic research . . . we view it as the most important contribution to Oceanography in thirty years, opening possibilities of oceanographic research which have thus far been denied to all." The letter suggests that the System be adapted for use in a free-drifting buoy project to measure ocean currents both on the surface and in depth which could pay off on a grand scale, speeding ships on their way by utilizing these ocean forces rather than setting courses that require overcoming them by brute strength.

The Bureau of Commercial Fisheries, Department of the Interior, has expressed interest in development of a simplified receiver to be incorporated in another liberty buoy concept to follow the wanderings of plankton fish-feeding beds. In analysis, they write, "Presently, they (the buoys) offer the advantage of providing directly an estimate of surface drift, and they have the disadvantage that they require some positioning method, both to use the data and recover the buoy. We have felt that a simple passive receiver, recording doppler counts from a navigation satellite, could be provided at a relatively modest cost, and make such drifting buoys useful and available." After the buoy has drifted for a period of time, it may be interrogated or recovered, and stored doppler counts "navigated-after-the-fact" to find out where the buoy—and the phytoplankton—have been. The Applied Physics Laboratory of Johns Hopkins University is conducting preliminary design studies of some simple, prototype buoy navigation receivers to provide environmental data of value in fisheries research as a basis for recommendations to the National Buoy Program administered by the U.S. Coast Guard.

When the oceanographic ship Argo, belonging to the Scripps Institute of Oceanography, sails from Colombo, Ceylon, on a 61,000-mile voyage, she will carry aboard a Magnavox 702, one of the first commercially available satellite receivers. The Argo will depend heavily upon satellite navigation for position references, since she will be operating in research areas where land-based positioning systems do not exist, or perform marginally at best, during the height of the monsoon season when a prevailing overcast severely limits any chances for celestial observations. The Argo will be conducting a wide variety of research projects, ranging from measuring currents induced at the equator by Earth's motion to plotting the drift of plankton beds in the Bay of Bengal and the Indian Ocean. A typical day's operations may involve cruising to a particular site, lying-to while certain research projects are performed, and then sailing off in random search of plankton beds measuring their extent and logging their drift and heading, and finally returning at sundown to the scheduled itinerary. Periodically, research buoys will be lowered overside, anchored, and their positions noted, to be located weeks later—by satellite positioning references—on a return leg of the voyage. The Navy Astronautics Group will be interested in progress reports received from the expedition, constituting a long-term performance test of an industry version of the satellite receiver under exacting conditions at sea.

Traditional dividing lines between strictly military and civil underseas research are gradually dissolving. Exploration of the deep oceans, and their use, tends to submerge divisive factors beneath the larger realm of our national interest. On April 17, 1968, the Secretary of the Navy noted, "The growing involvement of the Navy's oceanographic program with scientific, educational and industrial communities indicates the need for direct information channels to these areas." [1]

There is no area of oceanography, ocean engineering and development that is not of interest to the Navy. Institutional and industrial underseas research teams increasingly work hand-in-hand with Navy technology; a large portion of this work is presently underwritten by the Navy with this in mind. The Navy Navigation Satellite System represents a major breakthrough for the performance of oceanographic research contributed by the Navy to this joint effort. About 30 commercial navigation satellite receivers have been ordered initially by oceanographic, geodetic and geological study groups at private and state universities. These will be distributed through the Office of Naval Research.

Manifest benefits derived from positioning-by-satellite have been turned to good account by the Navy through installation of military navigation sets aboard cable laying and repair ships. Similarly, industrially-owned vessels engaged in this type of work, *e.g.*, the the C.S. Long Line belonging to the American Telephone and Telegraph Co., have recently had installed equivalent commercially produced user equipment—in this case, the Magnavox version.

Navigation-by-satellite readily associates with other navigation aids or dead reckoning systems to their mutual benefit. Navigation satellites complement inertial or hyperbolic radio navigation systems by providing an accurate position fix often enough to reset inertial navigation systems or to validate positions acquired though radio reckoning. Although this would suffice for most functions, some survey ships require a precise measurement of their positions equal to or better than the excellent accuracies demonstrated throughout the last four years of operational use by the Navy. Such an improvement can be obtained by translocation techniques used in combination with any ground-based hyperbolic navigation system, such as Loran, commonly found aboard ships engaged in this line of work. Used in this connection, satellite positioning obviates weather and ground, and skywave error factors inherent in low frequency wavelengths that have proven to be detrimental to the accuracies obtainable, especially at long range. On the other hand, navigation satellite computations must know the ship's motion during a satellite pass,

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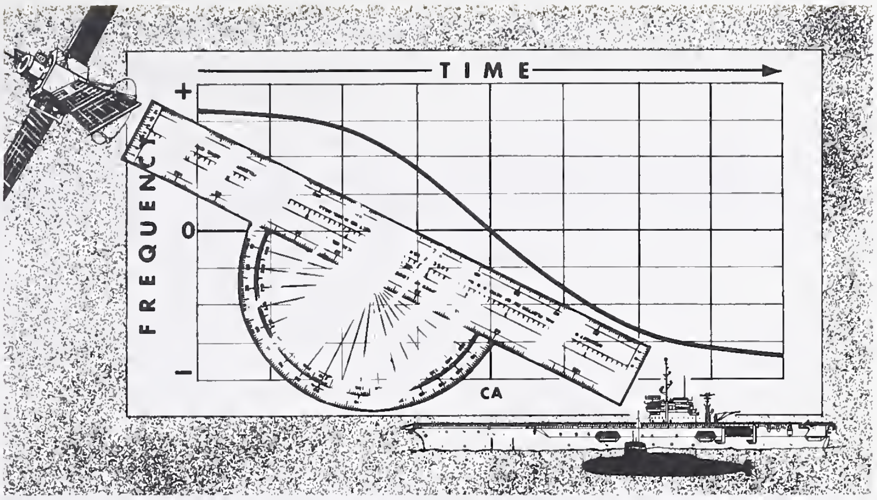
[1] *SECNAVNOTE 5720, Appendix V, "Oceanography," April 17, 1968.*

and that factor is readily available from any continuous navigation system. Some industrial applications requiring such hairline accuracies, which do not have this type of equipment on board, plan to use the Marquardt Corp.'s Doppler Sonar Velocity Equipment to provide an extremely accurate velocity input to the positioning data of a ship underway, either manually or on-call through computer interface.



The Navy Navigation Satellite System is a practical reality. It works. The Applied Physics Laboratory of Johns Hopkins University is responsible for the concept, design and development of the system. Based upon earlier conclusions of Drs. W. T. Guier and G. C. Wieffenbach, Dr. F. T. McClure suggested this new positioning method which won for him the first NASA award for important contributions to space development. He demonstrated that measurement, in terms of frequency and time, of doppler shift in signals generated by a satellite of known orbit could be used to fix one's position on Earth. The System was developed for the Navy by one of our country's most distinguished scientific teams led by Dr. R. B. Kerschner of the Applied Physics Laboratory. The System is fully operational. Since April 1962 it has been managed on a round-the-clock, year-long basis by the Navy Astronautics Group. It marks the first continuous use of space technology in direct support of the Fleet. Its use is being further extended by installation of satellite receiver equipment aboard an ever-increasing number of fleet units, and now the System has been cleared for private scientific and industrial exploitation. Proven results demonstrated by long-term operation of navigation satellites by the Navy Astronautics Group and successful use of these spacecraft by the Fleet have attracted widespread attention throughout the scientific community. Practical demonstration of the everyday usefulness of the Navy's Navigation Satellite System has acted as a springboard, stimulating the interest and imagination of science-in-industry. Several ideas which could refine, broaden, or complement the established operational system have been advanced by military, institutional, and industrial organizations in a healthy competitive scientific atmosphere. Most of these proposals have been reported in space periodicals and oceanographic and navigation "trade journals."

One suggestion deals with adapting ordinary merchant vessels to perform surveys calling for ultra-precise position references, through installation of commerical satellite receiving equipment. One factor which affects the degree of accuracy obtainable through the Navy positioning-by-satellite system is correct measurement of the ship's velocity during satellite reception. Such ships rarely afford the luxury of a computer on board, or of any of the high-quality position systems that yield this information. The "trade papers" tell us that industry is exploring comparatively low-cost ways to calculate ship's true velocity over the Earth more efficiently by measuring proportional voltages, local signal transmission times through the water alongside, or doppler sonar bounce.

Aerospace magazine, the official quarterly publication of the Aerospace Industries Association, mentions the report submitted by a joint Space Applications Study Group from the National Academy of Sciences and the National Research Council, speculating on potential side applications of Navy navigation satellites among other subjects on its agenda. This report concluded that "it is quite probable that a relatively unpublicized part of the space program, directed toward realizing practical benefits to be derived from it, will ultimately prove to be the most significant to mankind." This study is only one of many that are underway concerning valuable "by-product" applications associated with the satellite system operated by the Navy Astronautics Group.

At an isolated outpost belonging to an international network devoted to furthering geodetic knowledge for purely scientific purposes, the operators on duty tune to frequencies generated by a passing navigation satellite to set their "station clock." The first phase excursion in a fiducial timemarking BEEP frequency occurring every two minutes throughout satellite broadcasts will serve to synchronize station oscillators that approach an atomic clock in 24-hour accuracy. The validity of the tracking station's recorded scientific observations depends upon it.

Navigation satellites naturally suggest themselves as vehicles for universal time dissemination to synchronize timekeeping throughout the world. Right now, the time markers, precisely interspaced in data which navigation satellites continuously generate, are used to set clocks at widely scattered stations around the globe.

According to the U.S. Naval Space Surveillance System (SPASUR), a national agency that keeps track of all orbiting spacecraft and space "junk," there are more than a thousand artificial satellites in space. Approximately a twentieth of these are utilitarian, *i.e.*, they perform services that directly affect the everyday life of the populace below. Telstar, the communications satellite which relays color telecasts between Europe and the Americas and ESSA, whose cloudcover pictures of the United States appear daily on televised weather reports, is perhaps the most widely known to the public.

Because they perform so consistently in accord with laws of gravity and motion laid down by Sir Isaac Newton and Johannes Kepler, Earth-orbiting satellites are classic examples of constancy combined with wide coverage. They are useful to us as time-clocks in space to motivate operations requiring split-second timing on Earth, particularly when they are used in conjunction with two other highly significant technological developments of this decade—near-perfect time control and measurement in terms of frequencies generated by ultra-stable oscillators, and modern-day advances in the computer arts.

Navigation satellites are here to stay. They have already demonstrated sufficiently widespread industrial applications, expanding our economic outlook to justify expectations that there are again as many other applications yet undreamed of. It remains for science-industry to come up with these ideas. Perhaps the best way to take the first step in this direction is for industry to ask itself, "What can the Navy Navigation Satellite System do for me?"

Gordon Lange is Special Asst. for Information, Navy Astronautics Group. A Navy civilian employee since 1946, he has been head of Systems Information Div., Navy Astronautics Group since 1962. He has worked as art director in civilian advertising agencies. He attended Trinity and Barnard schools, N.Y., Williams College, Mass., and studied at the Art Students League, New York City. Mr. Lange both wrote and illustrated this article.

DCAS On-Site Engineering Services Furnished at Contractors' Facilities

Defense hardware today consists of some of the most technically complex equipment in the world. It is designed by engineers and, in many cases, built by engineers.

As the various items of military supply come down the production lines across the county, government engineers are on site, working with the contractors, helping to answer engineering problems.

These government engineers are key members of the Defense Contract Administration Services (DCAS) teams of the Defense Supply Agency which are responsible for defense contract administration.

About 600 DCAS engineers are either permanently assigned in plants of large defense contractors or act as mobile engineering consultants.

Mobile consultants provide a technical communications link between military procurement offices, contract administrators and contractor executives by visiting company facilities to consult with company engineers.

The mobility of DCAS engineers makes it possible for them to be available on short notice when engineering problems arise on a contract.

Here is what DCAS engineers provide for the defense contractor:

- Anticipate engineering problems resulting from inadequate specifications or engineering documentation, economic conditions, management, or other areas, and take necessary actions to avoid or minimize their impact.
- Interpret specifications and contract engineering clauses.
- Act as the procurement activity's engineering representative when delegated that authority.
- Assist in resolving engineering, production and quality problems.
- Relay, explain and amplify changes initiated by the procurement office and observe how these changes are made.
- Obtain technical assistance when required.
- Assist in establishing a value engineering program and in submission of value engineering change proposals.
- Explain contractor problems to procuring office engineering staff personnel to obtain fair and timely solutions.

Here is what DCAS engineers can provide for the program manager:

- Comment on engineering studies, designs and proposals.
- Ensure that the contractor complies with engineering requirements of the contract and technical support documentation.
- Assist in evaluating contractors' engineering and management control systems.
- Encourage the contractor to originate design change proposals which result in improved products at less cost, thus producing reportable savings for the procuring agency through cost reduction and value engineering.
- Monitor contractor performance to assure that technical requirements of the contract remain up to standards during the life of the contract.
- Provide on-site technical support in production, quality and engineering actions incident to contractor performance.
- Provide continuous liaison services with the defense contractor to ensure accurate interpretation of the program manager's changes and redirection.

Pamphlet Available on Civil Defense Training for Industry

A 16-page illustrated pamphlet that lists civil defense training courses of particular interest to industry has been published by the Business and Defense Service Administration, Department of Commerce, in cooperation with the Office of Civil Defense.

Titled, "Civil Defense Training for Business and Industry," the new publication lists courses oriented toward both peacetime and wartime disasters, including those dealing with nuclear weapons protection.

The booklet can be obtained from local civil defense offices or from the Assistant Director of Civil Defense (Industrial Participation), Office of Civil Defense, The Pentagon, Washington, D.C. 20310.

Naval Electronic Systems Command

Standardization of Components/Equipments

Frank Berg

In 1966, the Chief of Naval Material (NAVMAT) initiated a standardization program directed by NAVMAT Instruction 4120.97, titled "Standardization of Components/Equipments (C/E) Required for Fleet or Ashore Support." This instruction was the result of a 1965 study guided by the Deputy Chief of Naval Operations (Logistics) and the Chief of Naval Material to describe and analyze Navy logistic support, and to recommend remedial action for problems identified. The proliferation of equipments and components in the hull, electrical and machinery areas of the Navy had reached such proportions that a formal program was necessary in order to give visibility to progress made in the hardware standardization effort. The Chief of Naval Material included the electronics area in the program since it had similar problems.

This article describes the program relating to the standardization of electronics components and equipments (C/E) under the cognizance of the Naval Electronic Systems Command. The subject of standardization of components and equipments having naval application and managed by the Naval Material Command has been discussed in two articles appearing in the *Defense Industry Bulletin* (see "Standardization—The Answer to the Fleet Spare Parts Dilemma," January 1968, page 1; and "Standardization of Component/Equipment in the Naval Material Command," April 1968, page 14).

Lack of standardization has resulted in an excessive number of components and equipments with limited application and many with poor performance histories. Their use complicates logistic support, leads to excessive costs, excessive stocks of spare parts, and a proliferating increase in training requirements.

The NAVMAT Component/Equipment Standardization Program applies to all elements of the Naval Material Command covering all hardware, and covers all phases of system development, acquisition and maintenance of the hardware. It encompasses all systems, subsystems, equipments and components under the cognizance of the Naval Material Command, including aviation, ordnance, ships, electronics, and construction equipment. Stated in the broadest terms, the policy of the program is to:

- Include hardware standardization requirements in concept formulation, contract definition, procurement, production, maintenance, conversion, modernization and alternation.
- Standardize designs with inter- and intra-system standardization of C/E and parts.
- Reuse (in new design) existing, suitable C/E already supported in depth by the military system.
- Preclude use of limited application and poor performance C/E.
- Exercise configuration control to maintain standardization.
- Use procurement techniques to restrain proliferation.
- Effect item entry control in design selection and provisioning phases of material acquisition.

The attainment of an optimum degree of standardization by curbing C/E make and model multiplication, and resultant spare parts proliferation, must be within the bounds of the Armed Services Procurement Regulations (ASPR) and any governing requirements of the Defense Standardization Program. Standardization cannot be mandated arbitrarily but must result from thoroughly considered trade-offs, generally on the basis of total cost versus effectiveness.

By definition, the term "components /equipment" as applied here is defined as repairable items which either do require repair part support or will require it when introduced into Naval operating forces, afloat or ashore. In the electronics area, this program

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does not apply to repair parts such as capacitors, resistors, transformers, etc., but such equipments as transmitters, receivers, modems and repairable components, etc. The kinds or types of material to which Naval Electronic Systems Command (NAVELEX) is applying the policy of the NAVMAT instruction are those for which it has material support responsibilities assigned by command charter.

As of February 1968, these were:

- Shore (ground) electronics, complete.
- Shipboard electronic equipment under system control of the Naval Ship Systems Command, as follows: IFF (Identification Friend or Foe), electronics countermeasures, communications, and navigational aids.
- Undersea Surveillance System.
- Material support for Naval Air Systems Command electronic equipment, as follows: navigational aids, air traffic control, and meteorological electronic items.
- Space programs, satellite communications and material support of space surveillance.
- Shore-based strategic data systems; operations control centers.
- Data-link systems (external to ships and aircraft).
- Radiac equipment.
- General-purpose electronic test equipment, components, techniques, and services.
- Electronic systems not otherwise assigned.

The task for the standardization of electronics components and equipments is a difficult one. The dynamic changes in the state of the art, the complexity of equipments and systems, the preoccupation of the operating and engineering communities to specify more advanced, more reliable, more maintainable, smaller and less power consuming electronic hardware to meet changing military requirements are some of the forces at work with which standardization has to deal.

With these difficulties in mind, the immediate goals for standardization of NAVELEX components and equipments are, first, to determine the background and status to NAVELEX cognizance material and, second, to apply standardization planning and action. Background means the identification of a component and/or equipment and its association with one or more military requirements. Status means the performance ability of a component and/or equipment to meet one or more military requirements. Terms applicable to shipboard C/E authorized by the Office of the Chief of Naval Operations, known as suitability status classifications, are used to categorize performance ability. These are:

- **Planned Standard.** Classification denoting those equipments under evaluation or consideration. Approval for service use and classification is required for equipments in this category prior to installation.
- **Standard.** Classification denoting the most advanced and satisfactory equipment approved for service use. These are preferred for procurement.
- **Substitute Standard.** Classification denoting those equipments approved for service use which do not have as satisfactory military characteristics as Standard equipments. When necessary, these may be procured to supplement the supply of Standard equipments.
- **Limited Standard.** Classification denoting those equipments approved for service use which do not have as satisfactory military characteristics as Standard or Substitute Standard equipments, but are usable substitutes. Complete major units will not be procured, but component parts, accessories and complementary articles, even though they may also be Limited Standard equipments, may be procured if necessary and economical to maintain complete major units in serviceable condition throughout a reasonable life expectancy.
- **Obsolescent.** Classification denoting those equipments which no longer have satisfactory military characteristics, but which must be continued in service pending availability of improved replacements. Complete units, component parts, accessories, and complementary articles will normally not be procured for the specific purpose of maintaining this equipment. Spare parts common to other equipment in the supply establishment may be used, however, for their maintenance.
- **Obsolete.** Classification denoting those equipments which have been declared unsuitable for their original military purpose. Disposal of stocks of obsolete equipment will, in all cases, be expedited.

The previously mentioned goals, *i.e.*, to determine background and status of NAVELEX material and, secondly, to apply standardization planning and action utilizing these classification terms, are implemented by a number of tasks which are included presently in the standardization plan described by NAVELEX Instruction 4120.1. The interplay of these goals, terms, and tasks are shown in Figure 1.

Referring to Figure 1, notice that potential NAVELEX C/E, the need for which is generated by a military

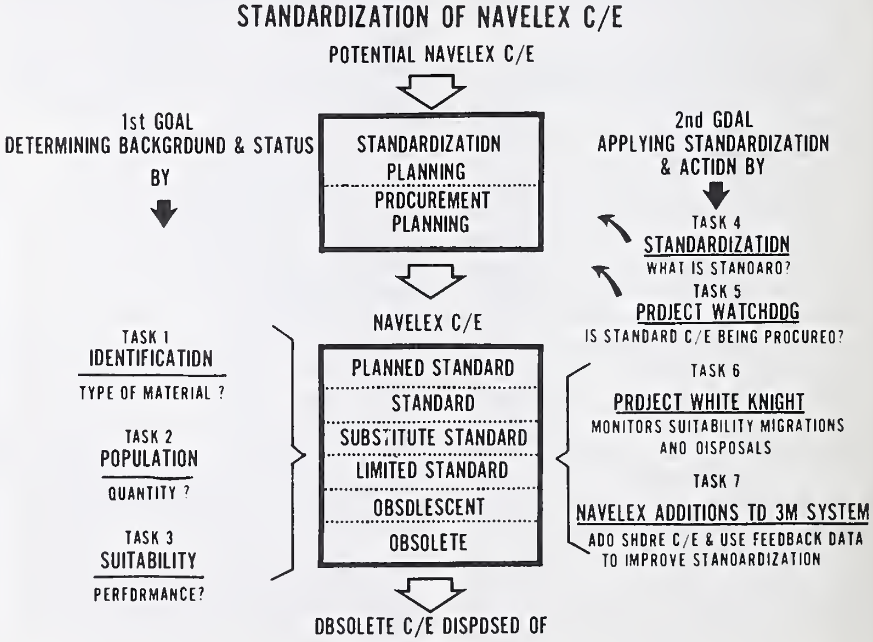

Figure 1.

SUMMARY OF POPULATION DATA (TASK 2) AND SUITABILITY ASSIGNMENTS (TASK 3)

FOR NAVELEX COMMUNICATIONS EQUIPMENT AFLOAT (ACTIVE FLEET)

# OF SCAT* ASSIGNMENTS ASSOCIATED WITH C/E TYPES	TYPE OF C/E	VARIETY OF NOMENCLATURED TYPES		SUITABILITY CLASSIFICATION AND C/E POPULATION AFLOAT (ACTIVE FLEET)						
		WHEN COUNTED WITH SUFFIXES**	WHEN COUNTED WITHOUT SUFFIXES	PLANNED STANDARD	STANDARD	SUBSTITUTE STANDARD	LIMITED STANDARD	OBSOLESCENT	OBSOLETE	TOTALS
16	RADIO TRANSMITTERS	97	36	0	2.702	1 496	62	6	3.989 [a]	8.255
11	RADIO RECEIVERS	114	42	11	1.273	2 325	4.077	5.664	3.603 [b]	16 953
34	RADIO TRANSCEIVERS	99	43	0	3.214	292	3.235	2 827	2.115 [c]	11.683
16	MODEMS	50	16	0	384	0	0	0	0	384
21	TELETYPES	119	67	0	6.185	4.358	1.749	2.381	443	15.116
TOTAL 98		479	204	11	13.758	8.471	9.123	10.878	10.150	52.391
% SUITABILITY CLASSIFICATION DISTRIBUTION OF 52.391 C/E				02%	26 26%	16 17%	17 42%	20.77%	19 36%	

NOTES: *SCAT Sub Category Requirement i e breakdown of functional requirements to be met by certain functional types of equipments and components such as transmitters receivers etc

** Suffix is defined as an alphabetical letter added to the basic nomenclature i e AN/WRC 18 The 8 is the suffix

(a) · 97 9 % or 3873 Transmitters consist of 6 nomenclatured types

(b) 95 8% or 3453 Receivers consist of 5 nomenclatured types

(c) 98 7% or 2089 Transceivers consist of 5 nomenclatured types

Figure 2.

requirement, starts at the top and in the center of the figure. Then in succession there is standardization planning, procurement planning, and as the material is procured, the various NAVELEX C/E flow into the rectangle which symbolizes installation in the operating forces, and become stratified according to their suitability status classification, *i.e.*, their ability to meet the military requirement for which procured. In the desired life-cycle history of C/E, material would start as a Planned Standard and migrate to successively lower strata classifications and, finally, to Obsolete C/E which is drained off when disposal takes place. The NAVELEX Standardization Plan then surrounds this basic flow and is implemented by the seven tasks identified in Figure 1.

The program responding to this plan is evolutionary due to the broad range of material and actions involved. Further tasks will be instituted as the program evolves. To determine the background and status of NAVELEX C/E, studies under Task 1, titled "Identification of NAVELEX C/E," have revealed approximately 9,000 differently nomenclatured or otherwise identified C/E recorded as having been used or being used afloat. Similarly, a total of approximately 18,000 differently identified NAVELEX C/E were or are applicable to use ashore. Many find application both ashore and afloat. Task 2, titled "Population Data for NAVELEX C/E," provides for a count in depth of these numbers of C/E presently installed afloat and ashore. Involved are both the active and reserve fleets, and all activities in the Naval Shore Establishment such as naval communication system radio stations, fleet training centers, reserve training centers, support activities, etc. With NAVELEX C/E identified and population counts made, Task 3, titled "Suitability Assignments for NAVELEX C/E," then determines the suitability status classification assignments, *i.e.*, Planned Standard, Standard, etc. Tasks 1, 2, and 3 together provide the background and status for the second program goal which is to apply standardization planning and action.

Some results of Tasks 1, 2, and 3 involved in a study of 52,391 NAVELEX C/E installed afloat, consisting of radio transmitters, receivers, transceivers, modems and teletypes, are tabulated in Figure 2.

A significant fact found in this study is that 97.9 percent of the Obsolete transmitters consist of only six nomenclatured types; 95.8 percent of the Obsolete receivers and 93.7 percent of the Obsolete transceivers consist of only five nomenclatured types each. This may be explained by the practice followed for many years of consolidating purchases of major shipboard electronic C/E as government-furnished equipment (GFE). Essentially such practice has placed a degree of control on what otherwise could have been unbridled proliferation of many types of C/E for given operational requirements. The fact that sizeable numbers of

NAVELEX COMPONENT/EQUIPMENT STANDARDIZATION

1. STANDARDIZATION OF GENERAL PURPOSE TEST EQUIPMENT

EQUIPMENT CATEGORY	FUNCTIONAL REQUIREMENTS	EQUIPMENT TYPES USED		STANDARDIZATION ACTION TO SATISFY FUNCTIONAL REQUIREMENTS AS OF 2/68
OSCILLOSCOPES	19	66		3 TYPES NOW STANDARD
	2	6		3 TYPES PLANNED STANDARD
	21	72	TOTAL	6 TYPES PLANNED PROCURE FY 69
SIGNAL GENERATORS	7	23		3 TYPES NOW STANDARD
	13	50		3 TYPES UNDER DEVELOPMENT
	20	73	TOTAL	6 TYPES PLANNED PROCURE FY-70
ELECTRONIC COUNTERS	6	27	TOTAL	2 TYPES NOW STANDARD

2. STANDARDIZATION OF CERTAIN RADIO TRANSMITTERS, RECEIVERS, AND TRANSCEIVERS

RADIO TRANSMITTERS	5	18	TOTAL	3 TYPES NOW STANDARD
RADIO RECEIVERS	6	28	TOTAL	5 TYPES NOW STANDARD
TRANSCEIVERS	3	4		1 NOW STANDARD
	12	11		2 TYPES PLANNED STANDARD
	15	15	TOTAL	3 TYPES PLANNED PROCURE FY-70

Figure 3.

Obsolete transmitters, receivers and transceivers are concentrated in so few nomenclatured types indicates that consolidating purchases assists in promoting standardization for a period of time.

To further promote standardization, the invoking of the multi-year instead of the single-year method of procurement even further serves to limit the proliferation of different type C/E for a requirement. Under the ASPR, if the multi-year method of procurement is invoked in a contract, the successful bidder may produce the C/E up to a maximum of five years rather than one. Thus, when electronics C/E is procured by the multi-year method, particularly where performance type specifications are involved, proliferation is reduced providing no engineering production changes are made on the contract involved. However, to keep a Navy standardized with hardware which is the product of an art as dynamic as electronics, for which military requirements are being changed or upgraded, is a very difficult task. Where C/E has been declared unsuitable for its original military purpose, a desirable and systematic replacement rate of installed Obsolete C/E has been prevented by limited annual funding levels and other budgetary priorities.

With the background and status of a family of NAVELEX C/E obtained, such as previously illustrated, Task 4, titled "NAVELEX C/E Standardization," then comes into play. This task provides visibility for standardization planning and action. Figure 3 illustrates Task 4 standardization accomplishments to date for certain general purpose oscilloscopes, signal generators, electronic counters and a number of shipboard radio transmitters, receivers and transceivers. Additional families of C/E are under study to establish background and status information, and then the goal of standardization. Documentation from which these studies are derived has influenced the selection of shipboard C/E first. It is anticipated that standardization studies of C/E for the Naval Shore Establishment will be far more difficult, since an applicable suitability status classification system has yet to be implemented. NAVELEX has commenced action in regard to this problem by issuance of a NAVELEX instruction which provides a systematic method for dealing with NAVELEX C/E used ashore as well as afloat.

We now come to Tasks 5, 6 and 7. Briefly, Task 5, titled "Project Watch Dog," addresses the subject of NAVELEX C/E procurement. Task 6, titled "Project White Knight," monitors changes in the suitability status classifications of NAVELEX C/E, and provides orderly procedures for withdrawal of support when Obsolete C/E is no longer installed. Task 7, titled "NAVELEX Additions to the Navy Maintenance and Material Management (3–M) System," provides visibility for the standardized preventative maintenance and maintenance data collection effort applicable to NAVELEX C/E.

Task 5 (Project Watch Dog) monitors Procurment Requests (PRs) to determine the extent to which Standard NAVELEX C/E is being procured, and appropriate military specification and standards are being cited in the PRs. It provides for feedback information to technical and logistic support organizations within NAVELEX to use as a basis for initiating or accelerating standardization programs for NAVELEX C/E. Full implementation of this task is dependent upon the assignment of suitability status classifications, where possible, to NAVELEX C/E used ashore and those used afloat having no assignments. When this occurs, this task will be able to more effectively police the degree that standardization is occurring each year as a result of procurement action.

At this stage in the evolution of the overall program, Project Watch Dog is making an analysis of C/E being procured. Two hundred and ten PRs available were analyzed under the following three categories:

- **Research, Development, Test and Evaluation (RDT&E) and Software Studies.** Procurement of RDT&E in technologies involving vacuum tubes and solid state, electro-optics, microwave, communications, special surveillance, field measurements, etc.; and studies involving cost effectiveness, electromagnetic compatibility, communications, etc.
- **Hardware.** Procurement of shore and shipboard electronics C/E involving communications, IFF (Identification Friend or Foe), electronic countermeasures and navigational aids, air traffic control, meteorology, radiac, general purpose test equipments, etc.
- **Services and Miscellaneous Items.** Procurement of engineering services, training assistance, modification kits, ancillary components used in installation, etc.

The purpose of this analysis was to determine the nature of what was being procured in order to orient the standardization effort. It became apparent from this analysis that the hardware category, comprising 65 percent of the 210 PRs analyzed and 59 percent of the total dollar value, was the prime area of interest to concentrate the standardization effort. This is the category where the standardization actions are taking place.

Task 6 (Project White Knight) monitors the migration or changes to NAVELEX C/E suitability status classifications, the disposal of those designated Obsolete, and the eventual elimination from the supply system of repair parts peculiar when no C/E remains. This task provides an orderly means of communicating to the Electronics Supply Office (ESO), Great Lakes, Ill., the changes taking place in the suitability status classification of NAVELEX C/E and a resulting change that may be required for repair parts support of the NAVELEX C/E affected. When Obsolete C/E is eliminated from installations, this task provides the trigger for informing ESO to cancel the Allowance Parts Lists (APLs) and commence declaring parts peculiar to the C/E involved excess to the needs of the supply system.

A total of 36 suitability status classification changes occurred during 1967. Of this number, 16 C/E were designated Obsolete. By definition these are declared unsuitable for their original military purpose. Disposal of stocks are to be expedited. Of the 16 C/E designated Obsolete during 1967, 1,348 are installed afloat and 147 ashore. Prior to the cancellation of the Allowance Parts List, and disposal of parts peculiar for Obsolete C/E, installed quantities must be reduced to zero. Project White Knight provides visibility for a number of vital factors surrounding the important decision of taking the final step of withdrawing interest and disposing of Obsolete C/E.

Finally Task 7 (NAVELEX Additions to the 3–M Systems) provides visibility to the number of ashore-installed NAVELEX C/E planned for under the 3–M System. This task describes part of NAVELEX's effort in standardizing preventive maintenance and maintenance-data collection. The system consists of two subsystems. One is the Planned Maintenance Subsystem (PMS) which includes the development of Maintenance Requirements Cards (MRCs), to provide standard scheduled maintenance procedures for each C/E and system. The other subsystem is the Maintenance-Data Collection Subsystem (MDCS) which includes the assignment of Equipment Identification Codes (EIC), resulting from an identification breakdown of shore-installed C/E into assemblies and subassemblies. These codes are used for C/E and system identification.

NAVELEX has the responsibility of providing maintenance support for NAVELEX C/E installed ashore. A pilot run is now underway to implement the 3–M System in shore facilities. A planned Maintenance Subsystem specification/purchase description has been completed for the procurement of MRCs with newly acquired NAVELEX C/E.

The Naval Ship Systems Command (NAVSHIPS) is the program manager for the 3–M System afloat. As of early 1968, 50 percent of all NAVSHIPS/NAVELEX nomenclatured electronic C/E used afloat and subject to the 3–M System were EIC coded. The Planned Maintenance Subsystem (PMS) applicable to electronics C/E has been delivered to 94 percent of the ships in the fleet.

The 3–M System input into the NAVELEX C/E Standardization Program provides an important source of data enabling decision on appropriate standardization status classification.

The proliferation of C/E used in systems and subsystems applicable to aviation, ordnance, ships, electronics, and construction equipment has become serious enough that formal programs have been initiated by the Chief of Naval Operations and the Chief of Naval Material for the Naval Systems Commands to develop all possible means of increasing standardization. C/E standardization, therefore, increases effectiveness and reduces costs for the Navy's use of its resources.

The NAVELEX plan of operation for standardization of material under its cognizance, as described in the foregoing, involves two goals. The first is to determine the background and status of NAVELEX C/E. The second is to apply standardization planning and action. A great engineering effort lies ahead due to the wide range of items involved.

Army Seeks New Methods for Soil Stabilization

The U. S. Army Combat Developments Command (CDC), Fort Belvoir, Va., is currently studying plans to provide better ground mobility by rapid soil stabilization and dust control. Realizing that present and future concepts of land and air operation are predicated on rapid reaction and high mobility of military forces, the CDC planners have completed a Qualitative Material Development Objective (QMDO) for soil stabilization.

A QMDO is a Department of the Army approved statement of a military need for development of new materiel. Speaking about methods to be used in development of soil stabilization, Major Theodore L. Doherty Jr., of the Mobility Division of the CDC Materiel Directorate and action officer on the project, said that "to achieve this objective the employment of new and different materials, techniques and equipment, other than the conventional means will be stressed."

When it becomes a reality, the rapid soil stabilization system will be used primarily by engineer combat and construction units to quickly stabilize road, beach, air landing, weapon firing, logistical storage, medical treatment facility, and other areas which require improved soil surfaces.

Army Tests New Gun-Tube Production Process

Auto-frettage, a process of applying extremely high pressure to the interior of a gun-tube surface to increase its serviceability, is now being applied for the first time to the huge 175mm gun by Army engineers.

The process is usually used only on small caliber weapons but engineers at the Army's Watervliet Arsenal in New York have produced six 175mm gun barrels using the auto-frettage technique.

If tests by the Army Test and Evaluation Command prove successful in increasing the service life of big weapons, auto-frettage may be used on a production basis for all future gun-tubes for the 175mm gun.

FROM THE SPEAKERS ROSTRUM

Unique Resources of Military-Industrial Team Can Benefit Total National Strength

Hon. Clark M. Clifford

Address by Hon. Clark M. Clifford, Secretary of Defense, at the Annual Dinner of the National Security Industrial Association, Washington, D. C., Sept. 26, 1968.

Since assuming my duties as the ninth Secretary of Defense, I have learned much about the valuable contributions the National Security Industrial Association has made to our defense posture. I am aware of your efforts to help us reduce costs. I know of the outstanding work of your advisory committees, which mobilize scientists, engineers and managers of industry to help us solve difficult technological problems.

I appreciate your efforts and, on behalf of the Defense Department, I thank you.

This assembly tonight is, however, something more than the annual dinner of a great organization. This audience is as close as one can ever come to assembling the leading representatives—in and out of uniform—of what General Eisenhower once referred to as the "military-industrial complex."

All of us recall his last speech to the nation as President in January 1961. Recognizing the absolute necessity for a strong Defense Department and a large and sophisticated arms industry, he felt compelled to draw attention to the fact that their relationship involved some grave implications for the country.

In my view, President Eisenhower's warning is well worth pondering, for this complex represents an immense pool of resources. The capital, manpower, and innovative thinking in this unique combination of industry and the military are equalled nowhere in the world.

Were these resources to be misdirected, squandered, or consumed inefficiently, the American people would be poorly served indeed.

Inevitably, there is danger when one is talking about the expenditure of $40, $60, or $80 billion a year.

Inevitably, there is danger when powerful industries present to Congress and to the Defense Department their logical proposals for new weapon systems or equipment. These are sincere proposals, designed to advance our military strength. The danger arises, not from some sinister intent on the part of the designer, but from the fact that this nation does not need and cannot afford every new weapon system which resourceful industry can design.

Inevitably, there is danger when each Military Department sincerely advocates maximum development of the weapons it would use in our national defense. There is danger when patriotic citizens mistakenly believe that something is good for the defense of our country just because potential enemies believe it is good for their country.

I am convinced today, after six months in this office, that the dangers General Eisenhower warned against were real dangers. But I am also convinced that they have been avoided, through the checks and balances of our governmental system. They have been avoided through the alertness of our Congress and the watchfulness of our press. They have been avoided because powerful pressures come from different directions and tend to offset themselves. They have been avoided by the strengthening of the Office of the Secretary of Defense. They have been avoided by the diligence of the Commander-in-Chief.

Industry and the military establishment, in partnership, have maintained a strong, modern and effective defense capable of meeting all tasks assigned by the President in support of our foreign policy and our national objectives. This nation has more military power today, better balanced in its make up, and better tailored to meet potential military threats, than any country has had in the history of the world.

That is the posture of military strength we maintain—and I pledge that is the posture of military strength we will continue to maintain.

However, I want to talk to you tonight about the subject of our total national strength. This, it seems to me, is appropriate because it is my job as Secretary of Defense to see that our country has the security that it needs. And it certainly is your job as members of this association.

Security, as we have traditionally viewed it, is the protection of our country from external threats. Our military forces are designed against such external threats; the Congress appropriates funds for this purpose and the American people expect us to fulfill this mission.

The question I raise tonight is: What are the basic elements of our total national security? The answer, I think, is clear: first, the power of the weapons of our armed forces; second, the quality of the training and leadership of those forces; third, the unity of the American people. The most modern of weapons will be inadequate to insure our survival in today's world unless our society is keyed to the steady improvement of our political institutions and concerned that all our people participate and share in the benefits of that society.

And I submit tonight that the Defense Department is not doing enough to promote in a positive way those aspects of our national life which are so essential to the preservation of our fundamental institutions.

What, after all, do the people most earnestly seek?

It would seem clear to me that our people want to secure their freedom. And it would seem clear that the elements of freedom are described in the Preamble to the Constitution of the United States more eloquently than anywhere else.

The establishment of justice.

Domestic tranquility.

The promotion of the general welfare.

The blessings of liberty.

It was for all those reasons that we sought to form a more perfect union, and it was for those reasons that the people of the United States did ordain and establish our Consititution.

But there are millions of Americans today who have not yet secured for themselves the elements of freedom set forth in the Preamble.

Assistance in Domestic Problems

I submit that the Defense Department, a Department which consumes 9 percent of the gross national product of our nation, a Department which employs four and one-half million Americans, has a deep obligation to contribute far more than it has ever contributed before to the social needs of our country.

Justice—domestic tranquility—general welfare—blessings of liberty. Can it be that these essential elements of freedom are a responsibility of the rest of the United States Government, but not of the Defense Department whose operations account for half of the total expenditures of that Government?

I believe that we in the Defense Department have not only a moral obligation, but an opportunity to contribute far more to the social needs of our country than we have ever done before.

Accordingly, I have today directed the Secretaries of the Army, Navy and Air Force, the Director of Research and Engineering, and the Assistant Secretaries of Defense to address themselves to this challenge.

I have asked that they provide me their proposals on how we may assist in alleviating some of our most pressing domestic problems and how DOD should best organize itself for this purpose.

I am asking for their recommendations by November 30 so that an initial concept can be offered to the new Administration in January.

This effort cannot be successful if we in the Pentagon attempt to implement it ourselves.

The Defense Department can and must work with industry, with labor, and with our great scientific and educational communities. And, of course, we shall need the understanding and support of the Congress.

The proven techniques and skills and resources of industry, combined with the proven organization and discipline of the Defense Department, can be utilized together far more effectively than heretofore for the benefit of our nation.

I believe we can do it.

I believe we must do it.

There will be those who will argue that the Defense Department is not a social welfare institution, and who will contend that it has no business interfering in the internal welfare of our country.

I have no intention of turning the Defense Department into something it should not be.

Of course, I do not regard the Defense Department primarily as an instrument of social welfare.

Of course, I do not believe that the Department should take over the responsibilities of other governmental or private agencies.

Nothing that I propose tonight, nor anything that I will propose so long as I hold this office, will be permitted to interfere with the performance of our historic mission to defend our nation.

But I do believe that the citizens of the United States have reason to expect—and indeed to demand—that the element of Government, which spends half of their Federal tax dollars, devote more of its time and more of its thinking and more of its resources to those aspects of our domestic problems which are important to our total national security.

Some might ask this question: "Are you attempting to say that a defense contract should consider not only whether the best weapon can be purchased for the cheapest price, but also whether the measurement of social utility should be included in the contract award decision?"

I am not making such a statement tonight. I do not yet know whether this would be a wise course or what changes in the present law should be considered.

But I do know that there are major areas of concern to our total national security in which the Defense Department—working with industry—can do more. Jobs are a matter of concern. So is education. So are housing, and health and hospital care.

I offer these only as examples of areas in which the Defense Department can be of greater assistance to the nation. The first preliminary steps have been taken by the Department in each. Sometimes they have been taken timidly as though the Defense Department were involving itself in something in which it really had no business.

Housing, hospitals, schools, and employment facilities for the unskilled normally do not possess enough capital resources to make an investment in innovation. They have little or no funds for research and development.

Housing

The average private-sector homebuilder throughout the nation constructs no more than 50 units a year. The average contractor cannot afford research and development into raw materials, advanced design, and better production techniques. He is faced with a small local market, he is enmeshed in a tangle of local building regulations, and he has a high per-unit cost which is reflected in his prices.

No wonder that low-income housing is so unattractive to private enterprise. There are not enough incentives to justify an entrepreneur risking his limited capital.

Every major city in the nation is faced with a serious slum problem which, in turn, leads to destructive social and family problems. Furthermore, slums perpetuate themselves. With minimal maintenance costs and inflated rents, owners have little financial motive to tear down their antiquated structures and replace them with decent housing.

This can and must be reversed.

What is clearly needed are new materials and new production techniques that will make low-income housing a profitable enterprise.

I suggest that is precisely where the Defense Department can, and must be, innovative and helpful.

The Department is the nation's biggest single user of housing. We currently spend some $200 million a year in new construction, plus another $450 million a year for maintenance and operation, debt servicing, and leasing of existing military housing. But of this $650 million annually, we have been spending virtually nothing for improvement of materials or better construction techniques.

We have begun to remedy the situation by awarding three contracts to explore whether we can lower the cost of military housing, while retaining quality standards. First reports suggest that savings of 15 percent or better may be realized through modular design, adoption of factory assembly methods, and volume procurement.

We are now at a stage where, with the support of Congress, we will design a prototype project and build it at George AFB, Calif. It will be watched with care and evaluated by both DOD and the Department of Housing and Urban Development.

Should this project turn out as we hope, we will have better military housing at lower cost, higher morale and thus improved military effectiveness. These innovations, passed along to the private economy, should have a beneficial impact on the low-income housing problem in our cities.

This beginning illustrates what can be done by the application of the techniques of a DOD effort to a major domestic problem. I ask members of this association to consider how your company can apply its Defense-gained skills to our national housing problems.

Housing needs help; so do hospitals. Costs are soaring—and for the understandable reason that 70 percent of hospital operating costs are wages.

Industry clearly can increase the application of its problem-solving resources to hospital design, construction and maintenance, and to automated record-keeping, laboratory analysis, and routine diagnostic services.

Hospital Design

This again calls for a significant research and development effort.

It is an effort generally beyond the scope of a city, county, or church group that builds a new hospital. Hospital design and construction are tradition-ridden. There is a great potential for major labor-saving, cost-cutting improvements in hospital equipment. But the local group which builds a hospital is almost always pressed for funds. It is compelled to use the "low-initial-cost" approach.

This results not in lower health-service cost. It builds in the absolute certainty that costs are going to mount.

Surely there is something we can do. The Defense Department is one of the world's largest hospital customers. There is every reason to believe that the cooperative approach of industry and the Department can be applied to hospital construction in the same manner that it is applied to the development and procurement of the complex intercontinental ballistic missile.

Therefore, I intend to proceed with a plan developed within DOD whereby we shall solicit industry for proposals for a whole new generation of hospitals—hospitals so automated that labor costs can be cut drastically, and routine services transferred from the overworked doctor and nurse to the sophisticated machine.

This will result in better, more accurate, and less costly hospital management for the Military Services. Even more significantly, it can point the way to better health care for our citizenry.

Education and Training

Let me now turn to schools and education.

We are far from the optimum development of our educational resources. The blunt fact is that we have focused much of the new technology in education on the exceptional student. For the average or below average youngster, education has been scarcely affected by the scientific revolution since World War II. Educators now say that traditional classroom procedures are not only inefficient but, in some cases, actually impede the average child's will to learn. If this is true of the student from middle-class America, we must acknowledge how badly we serve the child from the rural slum or the city ghetto, whatever his intellectual endowment may be. Much needs to be done.

The Defense Department can be, and to a degree has already begun to be, a trail blazer in the improvement of education. My predecessor, Robert S. McNamara, began the imaginative Project 100,000. He directed that the Armed Services admit to basic training a limited number of men who, under strict earlier regulations, would have been below military entrance requirements. He was convinced that these men, with the benefit of new teaching methods, would learn to do their military jobs satisfactorily. His confidence was justified. Project 100,000 has been a spectacular success. Of the men who entered during the first year of the program, over 90 percent are now performing effectively on active duty.

The Defense Department is one of the world's largest educators, and should be one of the world's best. We train military people in 1,500 separate skills, and our schools for Service children are in 28 countries around the globe.

The training obtained during military service has been for many Americans the open sesame to a fuller life. Now and for the indefinite future, millions more must serve to guard our country against external threats to its security. We can serve them and add immeasurably to that security by seeing to it that they leave military service equipped to accept a larger share of the problems and the rewards of American society.

I know that many of the companies represented here tonight have already entered the education field and have been working with us. I am aware of some promising work but we have just begun to explore the many useful ways for cooperation between industry and the Military Services. I am convinced, as I hope you are, that continued collaboration will not only help us do our job better, but that it can be the catalyst for improving school systems throughout the country.

Finally, I come to the problem of employment.

The National Alliance of Businessmen, launched last January as the result of President Johnson's vigorous efforts, has proved that there can be a workable relationship between the Federal Government and private industry in putting to work so-called unemployables from the heart of 50 of the nation's ghettos.

There is a real potential for defense industry to bring enterprise to the ghetto. There are already encouraging examples of what can be done, such as in the Watts area of Los Angeles and the Roxbury area of Boston. More than 50 of our major defense contractors have launched specific projects.

I want to see this sort of effort expanded.

Unemployment Problems

As a further step, I have directed today certain changes in the Armed Services Procurement Regulation [see article, "ASPR Changes Expand Emphasis on Labor Surplus Areas," following].The effect of these changes will be to encourage our major contractors to give greater attention to the possibility of locating new facilities in or near labor surplus areas, and to give more consideration to placing subcontracts in these areas. Through these changes in the regulation, I want to spotlight a responsibility, shared by the Defense Department and its major contractors, to contribute, wherever practical, to solving the problems of hard-core unemployment.

By law, we cannot award contracts on a sole source basis nor pay a price premium to relieve economic dislocation. This means we are forbidden from setting aside complete procurements for award exclusively to firms in labor surplus areas. We cannot award a contract without competition, regardless of the significant contribution such a contract might make to the hard-core unemployment program and the total national interest. I believe the time has come to reexamine this legislative policy.

With the approval of President Johnson, who has given so much of himself to the solution of problems of human rights and human suffering, I intend to join with the Secretaries of Labor and Commerce to determine whether there are still other ways in which the Defense Department and industry can join together in attacking the problems of hard-core unemployment in our society.

Let there be no doubt as to my strong feeling that the Defense Department has the opportunity and the responsibility to make a greater contribution to the social needs of the country, for it is my certain conviction that such action will contribute to our total national strength.

Not too many years ago, the War and Navy Departments were concerned almost exclusively with men and simple machines. Defense industries were regarded as mere munitions makers. How remote that era seems!

We now have a military-industrial team with unique resources of experience, engineering talent, management and problem-solving capacities, a team that must be used to help find the answers to complex domestic problems as it has found the answers to complex weapon systems. Those answers can be put to good use by our cities and our states, by our schools, by large and small business alike. The nation will be the better and the stronger.

I have no illusions that the tasks we have been discussing are simple, or that they can be accomplished overnight. The problems are many, and they will be with us for too long a time. But I am confident that the defense industries and the Defense Department can, while providing "for the common defence," also "promote the general Welfare" and make even more meaningful "the Blessings of Liberty to ourselves and our Posterity."

To this end, I bespeak your cooperation.

I pledge you mine.

ASPR Changes Expand Emphasis on Labor Surplus Areas

The Armed Services Procurement Regulation (ASPR) has been changed to reflect DOD's increased emphasis on allocating defense business to areas of concentrated unemployment or underemployment, when possible.

Until the changes can be published in a forthcoming Defense Procurement Circular, Assistant Secretary of Defense (Installations and Logistics) Thomas D. Morris provided the Military Departments and the Defense Supply Agency with advanced copies, so those agencies can promptly put the changes into effect.

Revision to ASPR 1–704.3 adds the following new paragraph:

> **(xi) He shall through Departmental channels bring to the attention of the Director for Small Business and Economic Utilization Policy possible contracting opportunities or the establishment of new facilities in or near sections of concentrated unemployment or underemployment and areas of persistent or substantial labor surplus.**

This approved revision requires small business specialists to review all procurements for possible contracting opportunities or opportunities to establish new facilities in or near sections of concentrated unemployment or underemployment and persistent or substantial labor surplus areas. This revision also requires that these opportunities be brought to the attention of the Director of Small Business and Economic Utilization Policy in the Office of the Assistant Secretary of Defense (Installations and Logistics).

Revision to ASPR 1–2100.1 adds the following new paragraph:

> **(c) The development of the AP (advance procurement) plan covering the contractual plan shall include a best effort to plan for the use and establishment of necessary facilities in or near sections of concentrated unemployment or underemployment and areas of persistent or substantial labor surplus.**

Revision to ASPR 3–902.1 adds the following new paragraph:

> **In reviewing the content of the proposed make-or-buy program, effort should be made to have the prime contractor establish any new facility in or near sections of concentrated unemployment or underemployment and in areas of persistent or substantial labor surplus.**

(Continued on page 18)

Revision to ASPR 3-902.3(a) adds the following new paragraph:

> **After considering such factors as capability, capacity, availability or small business and labor surplus area concerns as subcontract sources, the establishment of new facilities in or near sections of concentrated unemployment or underemployment, contract schedules, integrated control, . . .**

The approved revision to ASPR 3-902.3(a) adds an additional special factor that contracting officers must take into account when considering a contractor's make-or-buy program. In addition to such factors as capability, capacity and availability of small business and labor surplus area concerns as subcontract sources, contracting officers shall also consider establishment of new facilities in or near sections of concentrated unemployment or underemployment.

Revision to ASPR 3-902.3(a)(v) adds the following phrase:

> **Whether the facility is in or near section of concentrated unemployment or underemployment.**

Prospective contractors were required to recommend whether to make or buy each item, proposed subcontractors, if known, including location, and designation of plants in which the contractor proposes to make the item. The approved revision provides that a prospective contractor must also indicate whether his production facility is located in or near a section of unemployment or underemployment.

Revision to ASPR 23-202(a) adds the following new paragraph:

> **Whether consideration was given to the solicitation of small business and labor surplus area subcontract sources.**

Current regulations require contractors, under certain conditions, to obtain the contracting officer's advance approval to enter a subcontract. The regulation requires the contracting officer to review the factors used as the basis for selecting subcontractors. The approved revision to the regulation now requires the contracting officer to consider whether the prime contractor gave consideration to soliciting small business or labor surplus area subcontract sources.

The Secretary of Defense has approved these revisions to the ASPR and has directed that they be put into practice as soon as possible.

Sentinel ABM Production, Development Contracts Signed

The U.S. Army has signed two contracts totaling more than $475 million in value with Western Electric Co. for continued development and production work on the Sentinel Ballistic Missile Defense System.

Included in the contracts were funds for manufacturing the hardware to be installed at the first Sentinel operational sites, production management services, manufacturing and test engineering, and systems integration work.

The contracts include $273,171,000 for continued research and development on the system and $202,375,319 for production.

Western Electric officials said the company expects to subcontract more than 60 percent of both contracts to other firms. More than 3,000 companies are involved in the Sentinel program as subcontractors and suppliers of various goods and services.

The research and development contract includes funds for a prototype model of the long-range perimeter acquisition radar which will be constructed at the first Sentinel site near Boston, Mass.

The production contract includes funds for manufacture and procurement of components to be used in the Boston Missile Site radar. The prototype of this radar was built at the Kwajalein Missile Site in the Pacific.

Other components of the system which will be funded under both contracts are the high speed computers for the system and the long-range Spartan and short-range Sprint interceptor missiles.

Major subcontractors on the system and the approximate amounts planned for their efforts are:

General Electric Co., Syracuse, N.Y., Perimeter Acquisition Radar, $50,000,000 for R&D and $8,000,000 for production.

Raytheon Co., Wayland, Bedford, Andover and Waltham, Mass., Missile Site Radar, $10,000,000 for R&D and $50,000,000 for production.

McDonnell Douglas Corp., Santa Monica and Torrance, Calif., and St. Louis, Mo., Spartan Missile, $40,000,000 for R&D and $15,000,000 for production.

Martin Marietta Corp,, Orlando, Fla., Sprint Missile, $30,000,000 for R&D and $5,000,000 for production.

Lockheed Electronics Co., Los Angeles, Calif., computer equipment, $2,000,000 for R&D and $1,000,000 for production.

Radio Corporation of America, Harrison, N.J.; Texas Instruments Co., Dallas, Tex.; and Motorola Corp., Phoenix, Ariz., integrated circuit packages, each $9,000,000 in production funds.

Sperry Rand Corp., UNIVAC Div., St. Paul, Minn., computer program development, $1,000,000 in R&D funds.

Western Electric will perform the major part of its work at Greensboro, Burlington, and Winston-Salem, N.C., and Allentown, Pa. Bell Telephone Labs, a Western associate responsible for system technical design and development, performs its Sentinel operations at Whippany, N.J.

Lieutenant General Alfred D. Starbird, is Sentinel System Manager with headquarters in Alexandria, Va.

The development and production contracts were negotiated and signed with Western Electric by the Sentinel System Command, headed by Brigadier General I. O. Drewry. The command is responsible for managing the Sentinel development and production program for the system manager.

Lightning Subject of Symposium Dec. 3–5

The use and application of lightning and static-electricity protection techniques will be the subject of a three-day symposium to begin Dec. 3 at the Deauville Hotel, in Miami Beach, Fla.

Areas of concentration for the conference include: general aspects of lightning and static-electricity; fluids and fuels and special problems; grounding and bonding for flight vehicles; and non-conductive, nonmetallic structural materials.

Sponsors of the symposium are the Air Force Avionics Laboratory, Wright-Patterson AFB, Ohio, and the Society of Automotive Engineers.

G. R. Austin of the Electronic Warfare Division, Air Force Avionics Laboratory, is symposium chairman.

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Dr. Laurence E. Lynn Jr. has been sworn in as Dep. Asst. Secretary of Defense (Economic & Resource Analysis), in the Office of the Asst. Secretary of Defense (Systems Analysis).

Dr. Robert A. Huggins has succeeded **Dr. Robb M. Thomson** as Dir., Materials Sciences Office, Advanced Research Projects Agency.

C. **Robert Wieser** has assumed duties as Asst. Dir. (Defensive Systems), Office of the Dir., Defense Research & Engineering. He succeeds **Charles S. Lerch Jr.**

Col. Sherman R. Cummings, USAF, has been assigned as Chief of the Commercial Policy Div., Defense Communications Agency.

DEPARTMENT OF THE ARMY

T. Arthur Smith has been appointed Dir. of Cost Analysis, Office of the Comptroller of the Army.

Brig. Gen. George H. McBride has been named Dep. Commanding General, Air Defense Systems, at the Army Missile Command, Huntsville, Ala. He succeeds **Brig. Gen. Clarence C. Harvey Jr.** who has retired.

Col. James W. Ryan, who heads the Army's Research and Industrial Liaison Office at the Combat Developments Command, Fort Belvoir, Va., was promoted to his present rank Aug. 23.

The Institute of Systems Analysis at the Combat Developments Command, Fort Belvoir, Va., has appointed **Dr. Marion Bryson** as its new Technical Director.

DEPARTMENT OF THE NAVY

RAdm. Kenneth L. Veth, Commander, U.S. Naval Forces, Vietnam, will be the next Commandant, Fourth Naval Dist. **RAdm. Robert H. Speck,** who has been commandant since 1965, is retiring after 45 years active duty.

Capt. Charles B. Bishop has been selected as Commanding Officer of the Navy Underwater Sea Warfare Center, San Diego, Calif.

Capt. Vincent A. Lascara has relieved **RAdm. Douglas H. Lyness** as Commanding Officer, Fleet Material Support Office, Mechanicsburg, Pa. Adm. Lyness, who was recently advanced to flag rank, has been assigned duty as Commanding Officer, Navy Ships Store Office, Brooklyn, N.Y.

Capt. Paul K. Trahan will become Public Affairs Officer for the Naval Material Command on Nov. 1. He succeeds **Capt. Bernard S. Solomon** who is retiring from the Navy.

Capt. Justin A. O'Neil has assumed command of the Naval Avionics Facility, Indianapolis, Ind.

DEPARTMENT OF THE AIR FORCE

The following assignments have been made at Aeronautical Systems Div., Air Force Systems Command: **Col. Emerson B. Blair,** Dir., Crew and AGE Subsystems Engineering; **Col. Paul L. Deimling,** Chief, Technical Requirements and Standards Office; **Col. Lloyd M. N. Wenzel,** Dep. System Program Dir., F-X System Program Office; **Col. Howard H. Wittrock,** Asst. Dep., Systems Management; and **Col. Lawrence C. Wright,** Dir., Precision Weapons Delivery.

Col. Eugene Finke has been reassigned as Dir. of Research Programs, Office of Aerospace Research.

Col. Robert L. Jones is the new Chief, Electronic Data Processing Equipment Office, Electronic Systems Div., Air Force Systems Command.

Col. Robert Muldrow has been named as the new Dep. Commander, Deseret Test Center, Fort Douglas, Utah.

The Air Force Missile Development Center, Holloman AFB, N.M., announces the following assignments: **Col. James C. Manatt,** Vice Commander; **William J. Laubendorfer,** Chief Scientist; and **Lt. Col. William C. McCormick,** Dir., Technical Support.

New assignments at the Space and Missile Systems Organization, Air Force Systems Command, Los Angeles, Calif., include: **Col. Quentin J. Goss,** Dir. of Technology; **Col. Walter R. Taliaferro,** Dep. for Launch Vehicles; **Col. William J. Henderson,** Dir., Titan III System Program Office, and **Lt. Col. Fred W. Seybold,** Dir., Vela Satellite Program Office.

Oceanographic Research Cruise Schedules Announced

The latest edition of "Oceanographic Ship Operating Schedules," published for the National Council on Marine Resources and Engineering Development by the council's Committee on Marine Research, Education, and Facilities, is now available.

The 50-page pamphlet lists approximately 80 government-owned or sponsored ships which will participate in the national oceanographic program during the coming year.

Each ship listing includes expected cruise periods, geographic area of planned operation, type of work to be performed, and number of visiting scientists that can be accommodated.

Scientists interested in applying for available berths aboard oceanographic ships should apply directly to the agency or institution sponsoring the vessel. This information is included in the Operating Schedule.

Research data gathered during the cruises may be obtained from the National Oceanographic Data Center, U.S. Naval Station, Navy Yard Annex, Washington, D.C. 20390.

Single copies of the Oceanographic Ship Operating Schedules are available without charge from the Committee on Marine Research, Education, and Facilities, Building 159E, Room 476, Washington Navy Yard, Washington, D.C. 20390.

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BIBLIOGRAPHY

GOVERNMENT PRINTING OFFICE PUBLICATIONS

These publications may be purchased at the prices indicated from:

Superintendent of Documents
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Defense Communications System Engineering-Installation Standards Manual, Annex A, Television System and Equipment Standards. Establishes standards for high quality closed circuit TV systems and associated equipment, applicable to all elements of the Defense Communications Agency in the design and installation of command and control TV systems. 1967. 508 p. il. D5.104: 330-175–1/Annex A. $3.

Design Manuals. This series presents the criteria that shall be used in the design of facilities under the cognizance of the Naval Facilities Engineering Command:

Cold Regions Engineering. Basic requirements for naval shore facilities. 1968. 184 p. il. D209.14/2:9. $1.75.

Research, Development, and Test Facilities. Contains design criteria for buildings specifically designed for research, development and test at naval shore activities, and criteria of a general nature for the designing of launch pads, camera pads and telemetry. 1968. 33 p. il. D209:14/2:-31/2. 25¢

Changes 1 to NavFac DM 6, 22, 24, 33, and 35. Contains all changes to Design Manuals that were made during the period of July 1966–Dec. 1967. 1968. 149 p. D209:14/2:6–35/ch.1. $1.25.

How to Obtain Consideration for Architect-Engineer Contracts with DOD. Provides information and guidance in connection with the design of military public works projects. Outlines basic policies established by DOD governing the selection of architect-engineers, and describes procedures for obtaining consideration for architect-engineer contracts. Rev. 1968. 28 p. il. D7.6/4:Ar2/968. 15¢.

Industrial Plant Equipment Handbook, FSC 6625, Electrical and Electronic Properties Measuring and Testing Instruments. Contains standards for describing DOD-owned electrical and electronic properties measuring and testing instruments which have been identified as industrial plant equipment by the Defense Supply Agency. Rev. 1968. 794 p. D7.6/7: 4215 1/2. $3.75.

Oceanography 1967, Annual Report **Naval Oceanographic Office.** Provides a brief summary of the programs and efforts of the Naval Oceanographic Office. 1968. 75 p. il. pl D203.1:967. 45¢.

Changes to MILSTRIP **Assistance Program Address Directory, Supplement No. 2, Nov. 1, 1967, as Amended. Change No. 15, June 1, 1968.** 1968. 129 p. D7.6/4:M59/supp.2/ rev./ch. 15. 65¢. **Change No. 16, May 15, 1968.** 1968. 11 p. D7.6/4:M59/supp. 2/rev./ch.16. 10¢.

Research Reports

Organizations registered for service may obtain microfiche copies of these documents without charge from:

Defense Documentation Center
Cameron Station
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All organizations may purchase microfiche copies (65¢) or full-size copies ($3) of the documents (unless otherwise indicated) from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

List of DDC Users (Domestic Users Only). Defense Documentation Center, Alexandria, Va., July 1968, 435 p. Order No. AD–667 100.

Cost/Benefits of Technical Information Services and Technology Transfer. Defense Documentation Center, Alexandria, Va., July 1968, 297 p. Order No. AD–672 500.

Angular Distribution of Radiation Reflected from Carbon Dioxide Cryodeposits Formed on 77°K Surfaces. Thermal Radiation Section, ARO, Inc., Arnold Air Force Station, Tenn., for the Air Force 1968, 63 p. Order No. AD–668 432.

Tests and Investigations of a High Speed Towed Sonar Cable, Final Report. Boeing Co., Seattle, Wash., for the Navy, June 1966, 340 p. Order No. AD–822 939.

High Speed Harmonic Drive Speed Reducer. United Shoe Machinery Corp., Beverly, Mass., for the Army, Jan. 1968, 36 p. Order No. AD–667 383.

Solar Cell Power Systems for APL Satellites. Johns Hopkins University, Applied Physics Laboratory, Silver Spring, Md., for the Navy, Feb. 1968, 33 p. Order No. AD–668 144.

Effectiveness of an Inertial Air Cleaner in Extending Gas Turbine Life in a Dusty Environment. Southwest Research Institute, San Antonio, Tex., for the Army, March 1968, 58 p. Order No. AD–668 258.

Mechanochemistry of Coupled Contractile and Chemical Rate Processes. Weiaman Institute of Science, Rehovoth, Israel, for the Air Force, May 1968, 119 p. Order No. AD–668. 557.

Standard Alkaline Cells and Secondary Batteries. Army Electronics Command, Fort Monmouth, N.J., March 1968, 31 p. Order No. AD–668 654.

Pictorial Sonar Demonstration Model Program. Sperry Rand Corp., for the Navy, Feb. 1968, 65 p. Order No. AD–667 832.

Finite Difference Solutions of the Acoustic Radiation Equation in the Near Field. University of Houston, for the Navy, Sept. 1967, 55 p. Order No. AD–666 960.

Production and Measurement of Ultransonic Surface Waves. Georgetown University, for the Navy, March 1968, 37 p. Order No. AD–667 591.

Some Experiments with a Liquid Filled Acoustic Resonator Showing the Existence of Stable Bubbles in Water. Naval Research Lab., Washington, D.C., July 1967, 10 p. Order No. AD–667 585.

Standardization Documents Available from Single DOD Distribution Point

David Shapiro

Specifications and standards for items used by the Military Services are important documents to private industry bidding on or performing on a defense contract. These documents can be obtained from a single DOD point of distribution—the U. S. Naval Publications and Forms Center (formerly the Naval Supply Depot), 5801 Tabor Ave., Philadelphia, Pa. 19120.

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- Military Specifications.
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(*Continued inside back cover*)

David Shapiro has been Dep. Dir., of the Planning and Comptroller Department, Naval Publications and Forms Center, Philadelphia, Pa., for seven years. Previously, he was a Management Analysis Officer, Aviation Supply Office. He is a retired commander, USNR. He holds a masters degree in mathematics from Temple University.

Guidelines for Developing and Submitting Unsolicited Proposals

In its continuing search for new and imaginative ideas, Air Force Systems Command (AFSC) attempts to explore every potential resource, including the unsolicited proposal. In order to use to the fullest extent, the vast supply of intellectual resources available in the United States, AFSC encourages organizations or individuals outside the Air Force to suggest research and development ideas.

During FY 1968, AFSC evaluated 2,094 unsolicited proposals. Of this number, 459, or 21.9 percent, were accepted and funded at a cost to the Air Force of $119,154,817.

Voluntary proposals to perform research and development, unlike proposals which are requested by Air Force procurement activities from qualified sources, must be specially funded if adopted. Therefore, it is mandatory that the voluntary proposal be evaluated as offering significant advancement in the present state of the art before consideration for support by the Air Force can be given.

Advance Consultations

The Air Force Systems Command gives advance opinion on all proposed research and development efforts voluntarily suggested by organizations and individuals outside the Air Force. This opinion guides the submitter prior to the start of any extensive effort in the development of a detailed unsolicited proposal and is based on the assumption that there is a valid Air Force need for the suggested work. Prior personal contact with Air Force technical personnel, while not required, is permissible and encouraged. (All AFSC organizations, including names of individual contacts and the areas of interest of each organization, are listed at the end of this article.)

Proprietary Rights and Information

Unsolicited proposals do not necessarily contain proprietary information. They may be unique unto themselves, or may be no more than a restatement of existing Air Force requirements and, as such, should not be considered proprietary. Unsolicited proposals, which truly contain proprietary data, should have every paragraph revealing such data clearly marked "Proprietary Information" at the beginning and end of each paragraph.

When and How To Submit

Research and development proposals may be submitted at any time. An idea which is original in nature and concept, and which falls within the Air Force areas of interest may be submitted voluntarily.

While no rigid format is specified, elaborate brochures or presentations are definitely not desired. The best way to inform the Air Force Systems Command agencies of proposed efforts, and to determine if it has a potential usefulness to the Air Force, is by letter. The ABCs of successful proposals are accuracy, brevity and clarity. It is extremely important that the letter be prepared with great care so that it is easily read and easily understood. Specifically, the letter should include the following:

- Name and address of the organization.
- Type of organization (profit, non-profit).
- Concise title and abstract of the proposed research.
- An outline and discussion of the purpose of the research, the method of attack upon the problem, and the nature of the expected results.
- Name and research experience of the principal investigator.
- A suggestion as to the proposed starting and completion dates.
- An outline of the proposed budget, including information on equipment, facility, and personnel requirements.
- Names of any other Federal Agencies receiving the proposal. (This is extremely important.)
- Brief description of the facilities, particularly those which would be used in the proposed research effort.
- Brief outline of previous work and experience in the field.
- If available, a descriptive brochure and a financial statement should be included.

AFSC Form 91—Policy Agreement

AFSC Form 91, titled "Policy Agreement for Evaluation by the AFSC of Unsolicited Articles, Disclosures, Inventions, and Voluntary Proposals for Contract," is a statement of the terms under which the Air Force Systems Command will accept voluntary unsolicited proposals. This agreement must be signed by an officer of the company or the individual owning the intellectual property contained in the voluntary proposal prior to evaluation. It is designed for the mutual protection of all concerned and provides protection based on proprietary claims made by submitters of voluntary proposals.

No request for special exception or changes in the policy agreement will be granted. This agreement is to be executed only once (in duplicate) at the time of initial proposal submission. All subsequent proposal submissions will be covered by the executed Policy Agreement.

The Policy Agreement form is available from any AFSC office listed at the end of this article.

Evaluation

AFSC agencies are responsible for acknowledging receipt of unsolicited proposals. Unsolicited proposals will be thoroughly and completely evaluated by appropriate personnel engaged in the technical areas of effort similar to the unsolicited proposal under consideration. Results of the evaluation will be furnished to the submitter.

Arranging a Contract

The Air Force usually funds only those unsolicited proposals evaluated as offering significant advancement in the state of the art. If the unsolicited proposal is accepted, a contract may be negotiated between the organization and the appropriate AFSC activities. Contract details will be discussed and worked out between the submitter and the procurement activity of the AFSC activity concerned. In the event the proposal is not accepted, the Government is not obligated in any way to reimburse the submitter for any costs which may have been incurred in submitting the unsolicited proposal.

AFSC Unsolicited Proposal Focal Points

Headquarters, Air Force Systems Command (SCKPR)
Andrews AFB,
Washington, D.C. 20331
Phone: (301) 981–4531 or 981–4543
Mrs. Ann P. Wendt or
Mr. Seymour Milnovsky

Air Force Materials Laboratory (MAO–2)
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Mr. Sam Bakanauskas

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Propellant and combustion technology, liquid rocket technology, solid rocket technology, nuclear rocket technology; aerospace ground equipment, and rocket propulsion facility technologies.

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Phone: (505) 587–1110, Ext. 52236
Dr. H. J. Von Beckh

Prediction of adult reaction to stress, comparative social factors in primates (validation); animal test of life support systems, biophysical measurements, biomagnetics; animal training techniques and equipment, animal performance in hazardous environments.

USAF School of Aerospace Medicine (SMGS)
Brooks AFB, Tex. 78235
Phone: (512) 536–3577
Miss C. L. Reynolds

Physiological tolerance and mechanisms, physiological assessments in flight and simulators, habitable atmospheres, bioregenerative systems, hypogravity states; biological effects of radiation exposure, modification of radiation effects, operational hazards and tolerance, criteria in aerospace environments, biodosimetry; pathophysiological reactions, medical aspects of operational safety, medical implications of biological-chemical operations, preventive and occupational medicine, emergency medicine and evacuation; clinical medicine in aerospace operations; medical selection conditioning and maintenance, medical support operations, medical monitoring.

USAF Epidemiological Laboratory (EPC)
Lackland AFB, Tex. 78236
Phone: (512) 674–3211, Ext. 4248
Lt. Col. Chauncey W. Smith

Epidemiology.

6570th Aerospace Medical Research Laboratory (MRT)
Wright-Patterson AFB, Ohio 45433
Phone: (513) 785–5214 or 785–5227
Mr. E. E. Martin

Prediction and control of human behavior, basic mechanisms of selected physiological functions, fundamental biological data, organization and functions of nervous systems; design criteria of bionics, life support systems, chemoregenerative systems, protective equipment, waste management, nutrition, biomechanics, acceleration; (sustained) impact, vibration, acoustics, weightlessness; toxicology, individual protection and decontamination in bacterial-chemical operations; human engineering, training techniques, simulation techniques, and unusual environments.

Wilford Hall USAF Hospital (WHR)
Lackland AFB, Tex. 78236
Phone: (512) 671–4201
Lt. Col. K. H. Cooper

Clinical investigations, new techniques in medical practice.

Foreign Technology Division (TDKS)
Wright-Patterson AFB, Ohio 45433
Phone: (513) 257–1110, Ext. 70232
Mrs. L. R. Connally

Exposition of foreign innovations from foreign technology, development of detailed understanding of such innovations, and the reduction of this understanding to form useful to U.S. research and development and to DOD.

Space and Missile Systems Organization (SMTO)
Air Force Unit Post Office
Los Angeles, Calif. 90045
Phone: (213) 643–1766
Mr. Thomas A. Caruso

Development and acquisition of operational systems relative to satellites, space vehicles, and boosters required to launch them. Performs research associated with communication, launch services and maintenance of space vehicles. Manages Air Force ballistic missile acquisition programs and DOD programs for advanced ballistic reentry systems. Related responsibilities begin with systems concepts, and include development, production, delivery of operational systems, and site activations.

Electronic Systems Division (EST)
L. G. Hanscom Field
Bedford, Mass. 01731
Phone: (617) 274–6100, Ext. 3582
Mr. M. V. Ratynski

Plans for command and control and communications-electronics systems. It is the lead AFSC division for design and acquisition of systems, related equipment and services for command and control, communications-electronics and range instrumentation. Responsible for systems planning and acquisition in selected functional areas such as detection, surveillance, identification, threat evaluation and warning, weather and intelligence.

Air Force Eastern Test Range (ETES)
Patrick AFB, Fla. 32925
Phone: (305) 485–6525 or 485–7211
Mr. E. C. Allmon

Develops, maintains and operates range. Obtains and coordinates all government and contractor services needed to support DOD, NASA and other agency programs.

Air Force Western Test Range (WTGT)
Vandenberg AFB, Calif. 93437
Phone: (805) 866–1611, Ext. 67077
Mr. Stanley R. Radom

Develops, maintains and operates range. Obtains and coordinates all government and contractor services needed to support DOD, NASA and other agency programs.

Air Force Missile Development Center (MDMKN-4)
Holloman AFB, N.M. 88330
Phone: (505) 473–6511, Ext 7143
Mrs. W. Louise Holley

Provides test and test support for aircraft missiles, electronic systems, and reconnaissance systems; operates a data computation complex, the AFSC Navigation and Guidance Test Laboratory, and the high-speed test track.

Air Force Missile Development Center (Det. 1) Air Force Avionics Laboratory (AVNI)
Holloman AFB, N.M. 88330
Phone: (505) 473–6511, Ext. 52525
Mrs. Diane K. Kotera

Conducts in-house research and development of inertial navigation systems.

Air Force Flight Test Center (FTOP)
Edwards AFB, Calif. 93523

Phone: (805) 258–2111, Ext. 72146
Mr. Robert W. McLane

Conducts and provides support for tests of aircraft systems, operates the aerospace pilot school, and supports rocket propulsion, laboratory, and testing activities.

Armament Development and Test Center (ADAS)
Eglin AFB, Fla. 32542
Phone: (904) 882–2843
Mr. John V. Leftwich

Engineering development, test, evaluation, initial acquisition and program management of Air Force non-nuclear munitions. Conducts or supports development testing of weapon systems, electronic systems, armament systems, non-nuclear munitions, chemical-biological munitions, electronic countermeasures equipment, targets and scorers, drones, probes and miscellaneous items. Supports development and test of special air warfare tactics, techniques and equipment. The Office of Technical Applications for Southeast Asia identifies technical operational problems that lend themselves to quick-fix solutions. Areas of interest include munitions, avionics, aircraft, communications, surveillance and support.

Air Force Special Weapons Center (SWLPR)
Kirtland AFB, N. M. 87117
Phone: (505) 247–1711, Ext. 2134
Mr. Robert C. Blair

Conducts nuclear weapon compatibility and support equipment tests, nuclear weapons effects simulation tests and analyses to determine the survivability/vulnerability of USAF weapons. Provides aerial support for U.S. underground nuclear test programs and conducts airdrop tests of ballistic shapes. Operates high-performance test aircraft, and effects simulation, physical test, engineering and photographic laboratories, and fabrication shops with machining and microelectronics capabilities.

Arnold Engineering Development Center (AELR)
Arnold AFS, Tenn. 37389
Phone: (615) 455–2611, Ext. 252
Dr. H. K. Doetsch

Development testing in ground test facilities such as hypersonic and hypervelocity wind tunnels, chemical rocket and airbreathing propulsion test facilities, space simulation chambers, and aeroballistic and impact ranges. Continuous updating of present facilities and development of new concepts and technologies for design and construction of advanced facilities. Problem areas in thermodynamics, gasdynamics, chemistry, general physics, combustion, electronics, instrumentation, electrical power generation, all related to development and operation of ground test facilities.

Dragon Anti-Tank System Enters Production Stage

The Army will soon begin production of the Dragon, an anti-tank weapon system that is fired from the shoulder but is powerful and accurate enough to destroy armor and other field fortifications.

A contract for production engineering and production of the Dragon has been awarded to McDonnell-Douglas Corp., Titusville, Fla.

The contract has a total planned value of $133 million, which will be funded on an annual basis.

The Dragon guided missile system will be far superior in range, accuracy and lethality to the 90mm recoilless rifle it will replace. Weighing about 27 pounds, it will enable an individual soldier to stop an enemy tank with one shot.

Work to be performed under the contract includes advanced production engineering, engineering services and hardware production.

Dragon consists of two main items: a round and a tracker. The round comes enclosed in a container which doubles as a carrying case and serves as the recoilless launcher. The tracker contains a telescope, a sensor device and an electronics package.

To fire the Dragon, a soldier looks through the telescopic sight and launches the missile. He only has to keep his sight on the target until it is destroyed. Once the target is knocked out, the tracker is removed and the launcher is discarded. The tracker then can be attached quickly to the next round and the soldier is ready to fire again.

Colonel Kenneth C. Van Auken is Project Manager for the Dragon anti-tank weapon system. The project office is located at the Army Missile Command, Redstone Arsenal, Ala.

Communications SPOs Reorganized by ESD

The Deputate for Communications Systems of the Electronic Systems Division of the Air Force Systems Command, at L. G. Hanscom Field, Mass., has been reorganized. The Long Lines Communications System Program Office (SPO) and the Secure Communications SPO have been consolidated into a single Transmission and Switching SPO. The new office is headed by Colonel Conrad R. Peterson.

Other changes include the redesignation of the Survivable Communications SPO as the Tactical and Survivable Communications SPO, and the addition of a Special Communications Program Office. The Special Communications Program Office will be responsible for the communications segments of other systems being developed by the Electronics Systems Division.

Colonel John T. Tyler is the Director of the Tactical and Survivable Communications SPO. John A. Kelly is head of the Special Communications Program Office.

DOD Establishes Food Product Evaluation Committee

The Defense Department Directorate for Food Service, as part of its effort to consolidate and standardize common functions of the Armed Forces food programs, has established a Food Product Evaluation Committee.

The committee will evaluate unsolicited foods offered to the military and new items discovered by research and development. It will also try to improve existing foods and food packaging, and will coordinate introduction of new or improved foods.

Functions of the committee do not, however, include foods required by the Service commissaries, exchanges, clubs and recreational activities.

Point of contact for information is:

Chairman
Department of Defense Food Planning Board Product Evaluation Committee
1819 W. Pershing Road
Chicago, Ill. 60609

1968 Omnibus Act Authorizes Civil Works Projects

The Omnibus Rivers and Harbors and Flood Control and River Basin Monetary Authorization Act of 1968 authorizes the Army Corps of Engineers to construct, modify, or otherwise participate in the provision of 73 flood control, navigation, water conservation and other water resources projects, having an estimated Federal cost of $1,200,894,000.

This includes 41 flood control (including multiple-purpose) projects at a cost of $875,706,000; 31 navigation projects at an estimated Federal cost of $324,508,000; and one beach erosion project at an estimated Federal cost of $680,000. The Act authorizes eight surveys for flood control and allied purposes and three surveys in the interest of navigation and beach erosion control.

The Act also provides increased monetary authorizations totaling $469,000,000 for 13 basin plans. Limits have been placed by previous authorization Acts on the total appropriation which could be made to projects included in these basin plans. Increases are necessary at this time to permit additional appropriations to be made. The increases will permit the appropriation of funds necessary to meet scheduled funding requirements on planning and construction projects through calendar year 1969 in these 13 basin plans.

Listings of new construction and other authorizations with description and estimated Federal cost, where appropriate, follow. Initials before the projects indicate: N (navigation); FC (flood control); BE (beach erosion control); MP (multiple-purpose), and HFC (hurricane flood control).

ALASKA

Kake Harbor. (N) Breakwaters. $1,760,000.

King Cove Harbor. (N) Channel and anchorage areas. $522,000.

Sergius and Whitestone Narrows. (N) Deep draft channel. $3,030,000.

Tanana River at Fairbanks. (FC) Dams, levees and pumping plant. $111,700,000.

ARKANSAS

Belle Fountain. (FC) Drainage facilities. $4,638,000.

Crooked Creek at Harrison. (MP) Reservoir and local flood protection. $2,840,000.

Lake Chicot. (FC) Pumping plant and facilities. $15,240,000.

St. Francis River Basin. (FC) Modify local cooperation.

CALIFORNIA

Alhambra Creek. (FC) Channel improvement and diversions. $8,000,000.

Cucamonga Creek. (FC) Debris basins and improvements. $26,300,000.

Feather River at Chester. (FC) Diversion dam and channel. $940,000.

Humboldt Harbor and Bay. (N) Channels and anchorage area. $2,430,000.

Mad River. (MP) Multiple-purpose reservoir. $38,600,000.

Port Hueneme. (N) Channel and basin dredging. $1,000,000.

San Diego Harbor. (N) Widen and deepen channels. $5,360,000.

Sweetwater River. (FC) Channel and highway project. $4,900,000.

Ventura Marina. (N) Maintenance and improvements. $1,540,000.

COLORADO

Bear Creek. (MP) Mount Carbon Reservoir. $32,314,000.

CONNECTICUT

Norwalk River. (FC) Channel improvements. $2,700,000.

Park River. (FC) Conduits and pumping station. $30,300,000.

DELAWARE

Delaware Coast. (HFC) Erosion control and hurricane protection. $5,584,000.

FLORIDA

Brevard County. (BE) Fill placement. $680,000.

Dade County. (HFC) Erosion control and hurricane protection. $11,805,000.

Gulf Intracoastal Waterway, St. Marks to Tampa Bay. (N) Widen and deepen 234-mile waterway. $40,000,000.

Hillsborough Bay. (HFC) Protective barrier. $9,909,000.

Martin County. (FC) Canals, control structures and pumping station. $8,072,000.

Miami Harbor. (N) Channel deepening. $6,476,000.

Water resources, C&S Florida. (FC) Raise Lake Okeechobee and expand water control system. $58,182,000.

HAWAII

Harbors of refuge. (N) Improve three harbors. $1,256,000.

Iao Stream. (FC) Channel improvement and debris basin. $1,660,000.

ILLINOIS

Mississippi River, Cassville, Wis., to Mile 300, Ill. (FC) Levees and associated structures. $21,300,000.

INDIANA

Cal-Sag Bridges, pt. II. (N) Modify local cooperation. $33,265,000.

Wabash River. (MP) Four reservoirs and one local protection project. $50,000,000.

IOWA

Big Sioux, vic. of Sioux City. (FC) Channel improvements. $2,750,000.

Nishnabotna. (FC) Davids Creek Reservoir. $2,040,000.

KENTUCKY

Southwest Jefferson County. (FC) Pumping plants and water impoundment. $19,800,000.

LOUISIANA

Atchafalaya River and Bayous Chene, Boeuf and Black. (N) Channel improvements. $8,645,000.

Mississippi River—Gulf Outlet and Michoud Canal. (N) Enlarge and deepen waterway. $1,300,000.

Mississippi River, vic. of Venice. (N) Channel improvements. $4,520,000.

Red River Waterway. (N) Navigation channel and bank stabilization. $50,000,000.

MASSACHUSSETTS

Fall River Harbor. (N) Channel improvements. $8,762,000.

Ipswich River. (N) Channel improvements and anchorage areas. $616,000.

Lower Charles River. (MP) Multiple-purpose reservoir with locks. $18,620,000.

MICHIGAN

Detroit River, Trenton Channel.

(N) Extend and improve channel. $31,300,000.

Forestville Harbor. (N) Breakwaters and improvements. $538,000.

Tawas Bay Harbor. (N) Breakwater for recreational purposes. $466,000.

MINNESOTA

South Branch Wild Rice River and Felton Ditch. (FC) Channel improvements. $1,230,000.

MISSISSIPPI

Pascagoula River. (MP) Tallahala Reservoir. $16,360,000.

Yazoo River. (N) Channel improvements, lock and increase reservoir storage. $52,147,000.

MISSOURI

Little Blue River, vic. Kansas City. (MP). Two reservoirs and channel improvements. $38,492,000.

NEBRASKA

Papillion Creek and Tributaries. (MP). 21 reservoirs. $26,800,000.

NEW HAMPSHIRE

Connecticut River. (MP) Beaver Brook Reservoir. $1,185,000.

NEW YORK

Cattaraugus Creek Harbor. (N) Breakwaters, channels, etc. $1,315,000.

Hamlin Beach State Park. (N) Breakwaters, revetment, etc. $500,000.

Hempstead Harbor. (N) Construct turning basin & deepen channel. $703,000.

Port Jefferson. (N) Deep-draft channel. $2,455,000.

Wilson Harbor. (N) Extend and construct channel. $198,000.

NORTH CAROLINA

Cape Fear River. (MP) Randleman and Howards Mill Reservoirs. $31,923,000.

NORTH DAKOTA

Missouri River. (FC) Bank stabilization. $4,040,000.

OHIO

Licking River. (MP) Utica Reservoir and Newark local protection. $32,953,000.

RHODE ISLAND

Bristol Harbor. (N) Breakwater. $873,000.

SOUTH CAROLINA

Cooper River, Charleston Harbor. (N) Diversion and hydroelectric plant. $35,381,000.

TEXAS

Aquilla Creek watershed. (MP) Multiple-purpose reservoir. $23,612,000.

Clear Creek. (FC) Channel improvements. $12,600,000.

Corpus Christi Waterway. (N) Navigation improvements. $19,042,000.

Mouth of Colorado River. (N) Navigation channel. $8,000,000.

Navasota River. (MP) Millican and Navasota number two reservoirs. $119,707,000.

Pecan Bayou. (MP) Pecan Bayou Reservoir, channel improvements and protection to Lake Brownwood dam. $24,861,000.

Texas City and vicinity. (HFC) Levees and associated structures. $10,990,000.

UTAH

Salt Lake City Streams. (MP) Little Dell Reservoir. $22,664,000.

VIRGINIA

Rappahannock River. (MP) Salem Church Reservoir. $79,500,000.

WASHINGTON

Snohomish River, Everett Harbor. (N) Breakwater for small boat harbor and training dike. $1,108,000.

WISCONSIN

State Road and Ebner Coulees. (FC) Channel improvements and diversion. $6,849,000.

Other Authorizations

(Cost figures not available, in most cases, on these projects).

Beach Erosion. (BE) Shoreline erosion appraisal investigation and study.

Cairo, Ill. (FC) Pumping plants and drainage facilities.

Carlyle Reservoir, Ill. (FC) Authorization of royalty payments for mineral rights. Not to exceed $6,401.16.

Clinton Bridge Commission, Iowa. Grants consent to construct a highway bridge.

Devils Jump Reservoir project, Kentucky and Tennessee. (FC) Directs a joint review of this proposed project by the Departments of Interior and Agriculture and the Corps of Engineers.

Dworshak Dam and Reservoir Project, Idaho. (FC) Provides school facilities.

Fort Pierce, Fla. (BE) Modifies original cost arrangements.

Ironton, Ohio. (FC) Provides for closure structures. $58,000.

Lake Erie. Land conveyance to City of Buffalo, N.Y.

Libby Reservoir Project, Montana. (FC) Provides for relocation of Montana State Highway 37.

Marmet, W. Va. Modifies terms of original land conveyance.

Mason J. Niblack Levee, Ind. (FC) Provides for pumping facilities to remove interior drainage. $500,000.

Navigation projects. (N) Prevent or mitigate shores damages resulting from Federal navigation works, limited to $1,000,000 per project.

Painted Rock Reservoir, Ariz. (FC) Modifies items of local cooperation.

Pat Mayse Reservoir, Tex. (MP) Provides for acquisition of additional lands.

Pecos River, Carlsbad, N.M. (FC) Extends time limit for assurances of local cooperation.

Potomac River, Md. and Va. (N) Authorizes removal of abandoned ships, hulls and pilings. $175,000.

Streambank erosion. Authorizes streambank erosion study throughout the United States.

Water resource projects. Provides for resettlement of families displaced by water resource projects.

Weber River, Utah. (FC) Extends time limit for assurances of local cooperation.

River and Harbor Projects. (N) Authorizes the Corps to maintain excess depths required and constructed for defense purposes where such waterways also serve essential needs of general commerce.

Navigation Surveys

Back River, Md. (from Chesapeake Bay to Baltimore).

Savannah and Tennessee Rivers, S.C.

Lake Superior (between Lake Superior and the Mississippi River).

Flood Control Surveys

Burnett, Crystal, and Scotts Bays and vicinity, Baytown, Tex.

Linville Creek, Caney Creek and Tres Palacious, Tex.

Oso Creek, Tex.

Maddaket, Smith's Point and Broad Creek, Mass.

Streams at or near Spring Mountain Youth Camp, Nev.

Virgin River, Bunkerville, Mesquite and Riverside, Nev.

Cuyahoga River from Upper Kent to Portage Trail, Ohio.

Kalihi Stream, Honolulu, Oahu, Hawaii.

Small Business Share FY 1968 Procurement

Small business received 18.8 percent of the total prime contracts awarded by DOD in FY 1968, compared to 20.6 percent in FY 1967. The major reason for the decline in small business percentage was the change in the product mix of FY 1968 procurement. Contracts for missiles and space systems and for other major hard goods increased significantly, providing limited opportunities for small concerns to participate as prime contractors. The increase in ammunition procurement to support activities in Southeast Asia was another factor, since a major portion of this procurement is awarded to large contractors operating government-owned plants. The small business average was also adversely affected by a substantial decline in contracts for commercial items, construction, and purchases under $10,000, an area of procurement which provides the most frequent opportunities for awards to small business firms.

Prime contract awards for research, development, test and evaluation (RDT&E) are included in Table 1, and are shown separately by Military Department in Table 2. Data on subcontract commitments to small business firms, obtained from large business firms which received prime contract awards of $500,000 or more having substantial subcontracting possibilities, are shown in Table 3.

The statistics in the following tables were compiled by the Directorate for Statistical Services, Office of the Assistant Secretary of Defense (Comptroller).

Small Business Share of Defense Procurement

(Amounts in Thousands)

Type of Firm and Category of Procurement	Fiscal Year 1968 July 1967–June 1968	Fiscal Year 1967 July 1966–June 1967
DEFENSE PROCUREMENT (PRIME CONTRACTS) FROM ALL BUSINESS FIRMS—TOTAL	$40,304,066	$40,608,892
Missile and Space Systems	4,732,136	4,333,350
Aircraft	9,470,027	9,677,030
Other Major Hard Goods	12,277,569	11,816,401
Services	3,234,257	2,950,250
Commercial Items, Construction and All Purchases Under $10,000	9,772,629	11,031,984
Civil Functions	817,448	799,877
DEFENSE PROCUREMENT (PRIME CONTRACTS) FROM SMALL BUSINESS FIRMS—TOTAL	7,583,890	8,360,725
Missile and Space Systems	91,498	99,349
Aircraft	264,463	314,775
Other Major Hard Goods	1,428,873	1,591,249
Services	840,843	821,093
Commercial Items, Construction and All Purchases Under $10,000	4,642,416	5,246,579
Civil Functions	315,797	287,680
PERCENTAGE OF DEFENSE PRIME CONTRACTS TO SMALL BUSINESS FIRMS—TOTAL	18.8	20.6
Missile and Space Systems	1.9	2.3
Aircraft	2.8	3.3
Other Major Hard Goods	11.6	13.5
Services	26.0	27.8
Commercial Items, Construction and All Purchases Under $10,000	47.5	47.6
Civil Functions	38.6	36.0

Table 1

Small Business Share of Defense Procurement for Research, Development, Test and Evaluation Work

(Amounts in Thousands)

Type of Firm and Department	Fiscal Year 1968 July 1967–June 1968	Fiscal Year 1967 July 1966–June 1967
TOTAL	$5,769,041	$5,371,889
Army	1,152,754	1,123,624
Navy	1,476,768	1,375,404
Air Force	3,139,519	2,872,861
SMALL FIRMS	195,602	212,545
Army	57,483	55,224
Navy	83,827	97,635
Air Force	54,292	59,686
OTHER FIRMS	5,573,439	5,159,344
Army	1,095,271	1,068,400
Navy	1,392,941	1,277,769
Air Force	3,085,227	2,813,175
SMALL FIRMS AS A PERCENT OF TOTAL	3.4	4.0
Army	5.0	4.9
Navy	5.7	7.1
Air Force	1.7	2.1

Table 2

Small Business Share of Prime Contracts and Subcontracts

(Amounts in Thousands)

	Fiscal Year 1968 July 1967–June 1968	Fiscal Year 1967 July 1966–June 1967
PRIME CONTRACTS	$40,304,066	$40,608,892
Small Business Firms	7,583,890	8,360,725
Percent to Small Business	18.8%	20.6%
SUBCONTRACTS		
Number of Reports from Large Business Firms	879 *	816
Subcontract Commitments by Reporting Large Business Firms	15,207,399 *	15,471,506
Commitments to Small Business Firms	6,484,985 *	6,696,946
Percent to Small Business	42.6 *	43.3

* Preliminary, subject to revision.

Table 3

Department of Defense
Prime Contract Awards by State

Net Value of Military Procurement Actions by Department[a]

FISCAL YEAR 1968

(Amounts in Thousands)

STATE	Total		Army	Navy	Air Force	Defense Supply Agency
	Amount	Percent				
TOTAL, U.S. [b]	$41,241,125		$12,223,146	$12,703,851	$11,482,531	$4,831,597
NOT DISTRIBUTED BY STATE [c]	3,994,362		1,021,600	1,211,732	948,157	812,873
STATES TOTALS [d]	37,246,763	100.0	11,201,546	11,492,119	10,534,374	4,018,724
Alabama	409,189	1.1	207,744	60,912	60,227	80,306
Alaska	106,602	0.3	36,142	6,301	57,745	6,414
Arizona	287,045	0.8	105,276	62,091	109,196	10,482
Arkansas	121,272	0.3	37,640	2,568	47,047	34,017
California	6,470,306	17.4	1,160,634	2,201,735	2,462,250	645,687
Colorado	262,664	0.7	43,634	14,040	180,358	24,632
Connecticut	2,355,135	6.3	703,479	1,336,493	270,439	44,724
Delaware	42,614	0.1	11,692	6,666	5,658	18,598
District of Columbia	349,743	0.9	112,011	177,669	49,289	10,774
Florida	975,812	2.6	340,256	94,308	478,646	62,602
Georgia	964,223	2.6	74,108	52,313	753,055	84,747
Hawaii	95,623	0.3	28,835	52,721	9,528	4,539
Idaho	17,051	*	3,485	2,383	1,559	9,624
Illinois	932,115	2.5	488,409	128,120	147,985	167,601
Indiana	1,107,508	3.0	692,177	126,850	207,973	80,508
Iowa	260,980	0.7	141,956	26,912	43,087	49,025
Kansas	292,293	0.8	116,466	14,474	125,302	36,051
Kentucky	60,366	0.2	25,076	2,387	4,592	28,311
Louisiana	460,659	1.2	146,516	134,825	9,521	169,797
Maine	75,383	0.2	17,061	41,690	3,917	12,715
Maryland	703,857	1.9	175,747	360,394	129,822	37,894
Massachusetts	1,618,960	4.3	473,274	482,594	554,012	109,080
Michigan	796,211	2.1	524,901	86,397	94,603	90,310
Minnesota	620,123	1.7	204,716	171,083	210,773	33,551
Mississippi	369,261	1.0	14,125	290,615	12,931	51,590
Missouri	1,356,838	3.6	462,552	741,969	98,309	54,008
Montana	20,467	0.1	2,493	873	12,370	4,731
Nebraska	120,452	0.3	62,491	553	15,622	41,786
Nevada	17,897	*	7,043	2,462	6,762	1,630
New Hampshire	155,995	0.4	6,833	114,751	19,527	14,884
New Jersey	1,108,458	3.0	370,655	332,400	201,798	203,605
New Mexico	87,163	0.2	48,721	4,349	29,546	4,547
New York	3,483,885	9.4	783,913	1,822,932	611,531	265,509
North Carolina	487,259	1.3	247,639	94,393	22,664	122,563
North Dakota	68,072	0.2	6,558	50	42,339	19,125
Ohio	1,640,506	4.4	445,142	360,461	727,160	107,743
Oklahoma	164,806	0.4	31,610	6,544	75,574	51,078
Oregon	119,749	0.3	12,874	28,994	11,840	66,041
Pennsylvania	1,727,333	4.6	633,545	592,215	262,478	239,095
Rhode Island	126,362	0.3	27,149	67,137	1,238	30,838
South Carolina	133,041	0.4	13,857	31,878	23,256	64,050
South Dakota	33,585	0.1	953	7,664	23,259	1,709
Tennessee	541,631	1.5	318,316	45,756	78,604	98,955
Texas	4,087,132	11.0	1,047,608	788,555	1,762,762	488,207
Utah	131,195	0.4	34,781	6,027	63,263	27,124
Vermont	104,957	0.3	89,531	3,154	10,689	1,583
Virginia	692,671	1.9	264,740	327,339	35,815	64,777
Washington	529,532	1.4	40,816	111,240	312,163	65,313
West Virginia	131,522	0.4	96,750	10,153	7,525	17,094
Wisconsin	406,409	1.1	258,836	53,687	41,978	51,908
Wyoming	14,851	*	780	42	6,787	7,242

For Footnotes, see Page 35.

*Less than 0.05%.

Department of Defense Prime Contract Awards by State

Net Value of Military Procurement Actions by Fiscal Year[a]

FISCAL YEARS 1965, 1966 AND 1967

(Amounts in Thousands)

STATE	Fiscal Year 1965		Fiscal Year 1966		Fiscal Year 1967	
	Amount	Percent	Amount	Percent	Amount	Percent
TOTAL, U.S. [b]	$26,631,132		$35,713,061		$41,817,093	
NOT DISTRIBUTED BY STATE [c]	3,363,052		3,999,758		4,435,384	
STATE TOTALS [d]	23,268,080	100.0	31,713,303	100.0	37,381,709	100.0
Alabama	165,176	0.7	281,596	0.9	297,065	0.8
Alaska	74,175	0.3	71,666	0.2	85,648	0.2
Arizona	176,857	0.8	248,228	0.8	249,559	0.7
Arkansas	39,284	0.2	95,701	0.3	127,180	0.3
California	5,153,639	22.1	5,813,078	18.3	6,688,812	17.9
Colorado	249,151	1.1	255,893	0.8	210,409	0.6
Connecticut	1,180,111	5.1	2,051,560	6.5	1,935,895	5.2
Delaware	38,239	0.2	37,445	0.1	51,672	0.1
District of Columbia	247,576	1.0	328,111	1.0	357,666	1.0
Florida	633,332	2.7	766,955	2.4	799,005	2.1
Georgia	662,417	2.8	799,362	2.5	1,148,355	3.1
Hawaii	72,213	0.3	64,170	0.2	65,445	0.2
Idaho	11,724	0.1	20,004	*	14,772	*
Illinois	421,899	1.8	919,779	2.9	1,063,776	2.8
Indiana	604,925	2.6	1,068,259	3.4	898,247	2.4
Iowa	133,951	0.6	247,619	0.8	279,328	0.8
Kansas	229,051	1.0	312,629	1.0	398,918	1.1
Kentucky	42,749	0.2	70,057	0.2	124,294	0.3
Louisiana	255,834	1.1	302,906	1.0	656,031	1.8
Maine	68,771	0.3	51,340	0.2	56,558	0.2
Maryland	584,333	2.5	842,527	2.7	867,990	2.3
Massachusetts	1,178,729	5.1	1,335,952	4.2	1,422,272	3.8
Michigan	532,897	2.3	918,426	2.9	1,033,706	2.8
Minnesota	259,500	1.1	497,994	1.6	650,584	1.7
Mississippi	152,188	0.7	162,305	0.5	114,800	0.3
Missouri	1,060,781	4.6	1,112,665	3.5	2,277,597	6.1
Montana	69,375	0.3	13,779	*	78,452	0.2
Nebraska	42,708	0.2	80,478	0.3	103,522	0.3
Nevada	19,142	0.1	32,028	0.1	29,315	*
New Hampshire	52,400	0.2	109,591	0.3	162,551	0.4
New Jersey	820,309	3.5	1,090,122	3.4	1,234,768	3.3
New Mexico	84,137	0.4	86,230	0.3	80,472	0.2
New York	2,229,473	9.6	2,819,153	8.9	3,261,750	8.7
North Carolina	288,408	1.2	449,331	1.4	447,608	1.2
North Dakota	48,997	0.2	83,113	0.3	16,729	*
Ohio	863,113	3.7	1,588,955	5.0	1,602,593	4.3
Oklahoma	119,803	0.5	158,492	0.5	157,350	0.4
Oregon	39,624	0.2	89,983	0.3	99,319	0.3
Pennsylvania	988,811	4.2	1,665,087	5.3	1,649,091	4.4
Rhode Island	86,323	0.4	131,722	0.4	198,030	0.5
South Carolina	81,580	0.4	176,424	0.6	180,777	0.5
South Dakota	21,062	0.1	23,315	0.1	9,486	*
Tennessee	197,283	0.8	502,168	1.6	538,225	1.5
Texas	1,446,769	6.2	2,291,454	7.2	3,546,978	9.5
Utah	191,173	0.8	169,681	0.5	178,850	0.5
Vermont	32,202	0.1	81,066	0.3	100,157	0.3
Virginia	469,097	2.0	425,487	1.3	665,376	1.8
Washington	545,607	2.3	444,368	1.4	606,114	1.6
West Virginia	90,312	0.4	149,300	0.5	142,142	0.4
Wisconsin	203,003	0.9	364,684	1.1	383,602	1.0
Wyoming	7,867	*	11,112	*	32,868	0.1

For Footnotes, see page 35.

*Less than 0.05 percent.

Department of Defense

Prime Contract Awards by State

Net Value of Civil Functions Procurement Actions[a]

Fiscal Years 1965, 1966, 1967 and 1968

(Amounts in Thousands)

STATE	Fiscal Year 1965 Jul 64–Jun 65	Fiscal Year 1966 Jul 65–Jun 66	Fiscal Year 1967 Jul 66–Jun 67	Fiscal Year 1968 Jul 67–Jun 68
TOTAL, U.S. [b]	$847,926	$878,301	$819,218	$845,295
NOT DISTRIBUTED BY STATE [c]	41,020	43,532	40,875	44,810
STATE TOTALS [d]	806,906	834,769	778,343	800,485
Alabama	11,958	16,299	18,441	21,921
Alaska	39,516	15,808	2,818	7,250
Arizona	4,301	2,816	2,742	6,381
Arkansas	76,315	89,427	81,658	67,882
California	59,239	57,844	52,991	56,465
Colorado	3,702	922	1,539	3,471
Connecticut	5,476	5,197	7,212	5,761
Delaware	8,539	8,973	12,658	6,024
District of Columbia	887	866	1,071	299
Florida	27,659	26,273	35,334	30,439
Georgia	6,862	7,345	9,390	15,333
Hawaii	1,608	1,439	244	711
Idaho	3,060	5,822	19,556	26,290
Illinois	24,194	22,192	18,046	25,919
Indiana	22,597	25,080	18,052	21,627
Iowa	14,365	12,160	14,578	12,705
Kansas	18,248	12,884	11,611	7,153
Kentucky	19,303	20,219	21,701	19,438
Louisiana	32,156	54,921	40,600	41,074
Maine	2,238	1,628	1,326	1,087
Maryland	21,457	10,212	1,716	4,055
Massachusetts	11,993	5,065	2,703	4,879
Michigan	12,035	13,027	10,915	8,050
Minnesota	1,686	4,128	3,902	4,398
Mississippi	12,018	16,594	18,300	10,586
Missouri	22,756	29,799	30,941	26,417
Montana	1,100	3,774	21,840	52,656
Nebraska	8,148	8,613	6,112	6,860
Nevada	0	0	17	33
New Hampshire	2,431	1,693	107	156
New Jersey	6,803	3,303	2,163	4,388
New Mexico	1,117	3,748	5,955	9,157
New York	13,535	12,400	8,351	14,726
North Carolina	3,797	4,004	3,534	3,329
North Dakota	1,739	3,311	2,151	1,462
Ohio	17,939	15,884	12,442	18,639
Oklahoma	13,952	31,514	48,773	51,698
Oregon	74,243	86,906	44,354	29,995
Pennsylvania	41,620	37,776	37,760	30,445
Rhode Island	4,951	4,491	574	4,234
South Carolina	3,608	2,472	2,571	4,151
South Dakota	10,915	6,351	2,249	1,662
Tennessee	14,626	18,773	14,039	12,141
Texas	39,420	32,310	28,317	32,146
Utah	41	565	0	25
Vermont	33	58	90	101
Virginia	9,364	6,360	8,764	8,992
Washington	36,323	55,957	58,974	54,128
West Virginia	33,587	23,182	24,039	18,937
Wisconsin	3,426	4,094	5,122	4,775
Wyoming	20	290	0	34

For Footnotes, see page 35.

DOD Prime Contract Awards by State

Footnotes

[a] See Notes on Coverage below.

[b] Includes all contracts awarded for work performance in the United States. The United States includes the 50 states, the District of Columbia, U. S. possessions, the Canal Zone, the Commonwealth of Puerto Rico, and other areas subject to the complete sovereignty of the United States, but does not include occupied Japanese Islands and Trust Territories.

[c] Includes contracts of less than $10,000, all contracts awarded for work performance in the Commonwealth of Puerto Rico, U.S. possessions, and other areas subject to the complete sovereignty of the United States, contracts which are in a classified location, and any intragovernmental contracts entered into overseas.

[d] Net value of contracts of $10,000 or more for work in each state and the District of Columbia.

[e] Civil functions of the Army Corps of Engineers for flood control and rivers and harbors work. Civil functions data are shown separately, and are not included in military functions tabulations.

Notes on Coverage

It is emphasized that data on prime contracts by state do not provide any direct indication as to the state in which the actual production work is done. For the majority of contracts with manufacturers, the data reflect the location of the plant where the product will be finally processed and assembled. If processing or assembly is to be performed in more than one plant of a prime contractor, the location shown is the plant where the largest dollar amount of work will take place. Construction contracts are shown for the state where the contruction is to be performed. For purchases from wholesale or other distribution firms, the location is the address of the contractor's place of business. For service contracts, the location is generally the place where the service is performed, but for transportation and communications services the home office address is frequently used.

More important is the fact that the reports refer to prime contracts only, and cannot in any way reflect the distribution of the very substantial amount of material and component fabrication and other subcontract work that may be done outside the state where final assembly or delivery takes place.

The report includes definitive contracts, and funded portions of letter contracts and letters of intent, job orders, task orders, and purchase orders on industrial firms, and also includes interdepartmental purchases, made from or through other governmental agencies, such as those made through the General Services Administration. The state data include upward or downward revisions and adjustments of $10,000 or more, such as cancellations, price changes, supplemental agreements, amendments, etc.

The estimated amounts of indefinite delivery, open-end or call type contracts for petroleum are included in the report. Except for petroleum contracts, the report does not include indefinite delivery, open-end, or call type contracts as such, but does include specific purchase or delivery orders of $10,000 or more which are placed against these contracts. Also excluded from the report are project orders, *i.e.*, production orders issued to government-owned-and-operated facilities such as Navy shipyards. However, the report includes the contracts placed with industry by the government-operated facility to complete the production order.

Conference Date Changed

The date of the Defense Procurement Conference to be held in Los Angeles, Calif., has been changed to Dec. 6.

The conference was originally set for Dec. 1.

Information contact and location of the conference will remain as previously announced in the September issue of the *Defense Industry Bulletin* on page 29.

Clearinghouse Begins New Title Review Service

The Clearinghouse for Federal Scientific and Technical Information of the U.S. Department of Commerce's National Bureau of Standards has inaugurated a new announcement service designed for quick review by the user.

Called CAST, Clearinghouse Announcements in Science and Technology, the new system will provide all report titles made available to the clearinghouse under 46 separate categories of technology.

CASTs will be published twice a month, on the 10th and 25th, and will average four pages per category. The new service began with the July 10 issue.

Subscriptions to CAST are now available from the Clearinghouse at $5 a year ($6.25 foreign) for the first category, and $5 a year ($6.25 foreign) for each additional two categories.

For a sample copy and subscription order blank for CAST, write to:

Clearinghouse (410.61)
U.S. Department of Commerce
Springfield, Va. 22151

International Ocean Exploration Urged

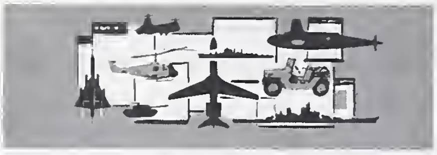
The National Council on Marine Resources and Engineering Development has released a report that urges all nations to join together in efforts to plan, develop and implement programs for exploring the world's oceans.

The report, titled "International Decade of Ocean Exploration," was made by the council in response to President Johnson's proposal for an International Decade of Ocean Exploration for the 1970s.

Purpose of the 12-page report is to foster further development of the decade concept by scientists, engineers, and representatives from industry and governments.

To plan the U.S. contribution to the Decade, a joint non-government/government planning staff will be established by the National Council on Marine Resources and Engineering Development.

The report is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at 15¢ a copy.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of September 1968.

DEFENSE SUPPLY AGENCY

4—**Valley Metallurgical Processing Co.**, Essex, Conn. $1,381,171. 1,894,875 lbs. of magnesium powder. Defense General Supply Center, Richmond, Va. DSA 400–69–C–1310.

10—**I.B.M. Corp.**, Washington, D.C. $1,595,000. Purchase of previously leased automatic data processing equipment. Defense Supply Agency, Alexandria, Va. DSAH–00–69–F–0004.

13—**Safety First Shoe Co.**, Nashville, Tenn. $1,439,816. 165,488 pairs of combat boots. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–0434.

—**Randolph Mfg. Co.**, Randolph, Mass. $1,170,400. 140,000 pairs of combat boots. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–0433.

—**Bata Shoe Co.**, Belcamp, Md. $3,913,631. 434,337 pairs of combat boots. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–0435.

—**Alabama Refining Co.**, Theodore, Ala. $1,094,184. 10,920,000 gallons of JP–4 jet fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–2178 MOD P003.

—**Atlantic Richfield Co.**, Philadelphia, Pa. $2,213,400. 21,000,000 gallons of JP–4 jet fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–0429 MOD P001.

—**Cities Service Oil Co.**, New York, N.Y. $2,037,504. 21,000,000 gallons of JP–4 jet fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–0429 MOD P006.

—**Mobil Oil Corp.**, New York, N.Y. $1,616,380. 14,600,000 gallons of JP–4 jet fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–2225 MOD P007.

—**Phillips Petroleum Co.**, Bartlesville, Okla. $1,021,925. 10,250,000 gallons of JP–4 jet fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–2232 MOD P003.

—**Southwestern Oil & Refining Co.**, Corpus Christi, Tex. $2,502,360. 25,200,000 gallons of JP–4 jet fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–68–D–2240 MOD P005.

16—**Gulf Oil**, New York, N.Y. $3,786,132. 37,800,000 gallons of JP–5 jet fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–2166.

19—**United Fruit & Food Corp.**, Boston, Mass. $2,229,787. 175,266 pounds of dehydrated shrimp. Defense Personnel Support Center, Philadelphia, Pa. DSA 130–69–C–E016.

23—**Blue Bell, Inc.**, Greensboro, N.C. $1,657,100. 1,764,242 pairs of men's cotton sateen trousers. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–0432.

—**Marcie Dale**, Atlantic City, N.J. $1,993,734. 119,100 men's wool serge coats for the Marine Corps. Defense Personnel Support Center, Philadelphia, Pa. DSA 100–69–C–0473.

—**Gulf Oil Corp.**, Houston, Tex. $1,240,842. 251,630 barrels of diesel fuel and 38,500 barrels of number six fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–0377.

—**Shell Oil Co.**, New York, N.Y. $1,045,859. 541,000 barrels of number six fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–0390.

24—**Pioneer Bag Co.**, Kansas City, Mo. $3,273,435. 5,956,000 polypropylene sandbags and 6,875,000 acrylic sandbags. Defense General Supply Center, Richmond, Va. DSA 400–69–C–1141–P001.

—**Cavalier Bag Co.**, Lumberton, N.C. $12,682,517. 28,044,000 polypropylene sandbags and 24,125,000 acrylic sandbags. Defense General Supply Center, Richmond, Va. DSA 400–69–C–1144–P001.

26—**Mobil Oil Corp.**, New York, N.Y. $2,023,129. 5,000 gallons of gasoline, 14,250 barrels of diesel fuel and 1,050,300 barrels of number six fuel oil. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–0387.

—**Union Oil Co.**, Los Angeles, Calif. $1,558,271. 1,080,000 barrels of number six fuel oil and 1,750 barrels of diesel fuel. Defense Fuel Supply Center, Alexandria, Va. DSA 600–69–D–0397.

30—**West Point- Pepperell, Inc.**, New York, N.Y. $3,632,695. 1,965,000 linear yards of nylon ballistic cloth. Defense Personnel Support Center, Philadelphia, Pa. AG31–69–C–0059.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting Agency—Contract Number.

DEPARTMENT OF THE ARMY

3—**Mills Mfg. Corp.**, Ashville, N.C. $1,917,648. Cargo parachutes. Aviation Materiel Command, St. Louis, Mo. DA AJ01–69–C–0120.

—**Pace Corp.**, Memphis, Tenn. $1,869,210. M1A2 torpedo demolition kits. Army Procurement Agency, Cincinnati, Ohio. DA AG31–69–C–0059.

—**MacGregor Triangle Co.**, Boise, Idaho. $3,229,216. Work on roads near the Libby, Mont., dam project. Engineer Dist., Seattle, Wash. DA CW67–67–69–C–0009.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $9,734,400. UH–1N helicopters. Hurst, Tex. Aviation Materiel Command, St. Louis, Mo. DA AF01–69–C–0085.

—**Standard Container Co.**, Montclair, N.J. $1,007,784. M2A1 ammunition boxes. Homerville, Ga. Frankford Arsenal, Philadelphia, Pa. DA AA25–68–C–0558.

—**Hughes Tool Co.**, Culver City, Calif. $7,296,000. OH-6A light observation helicopters. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–C–1789.

4—**Colt's Inc.**, Hartford, Conn. $2,395,503. Seventeen line items of repair parts in support of the M16 weapons family. Army Weapons Command, Rock Island, Ill. DA AF03–69–C–0009.

—**General Motors**, Cleveland, Ohio. $20,738,456. M551 armored reconnaissance airborne assault vehicles. Army Weapons Command, Rock Island, Ill. DA 11–199–AMC–00610 (W).

5—**Northrop-Carolina, Inc.**, Ashville, N.C. $1,804,595. 40mm cartridges. Swannanoa, N.C. Edgewood Arsenal, Edgewood, Md. DA AA15–68–C–0662.

—**United Aircraft**, Startford, Conn. $3,500,000. CH–54A helicopters complete with engine air particle separators and crew armor. Aviation Materiel Command. St. Louis, Mo. DA AJ01–68–C–0827.

6—**Philco Ford Corp.**, Newport Beach, Calif. $3,634,000. A classified amount of Chaparral fire units, and weapons system test equipment. Anaheim, Calif. Army Missile Command, Huntsville, Ala. DA AH01–69–C–0368.

—**Eureka Williams Co.**, Bloomington, Ill. $6,833,664. Metal parts for nose fuzes for aerial bombs. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0068.

—**United Aircraft**, Stratford, Conn. $3,500,000 (contract modification). Product improvement program to increase the capability of CH–54A helicopters. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–C–0827.

—**Bell Helicopter**, Fort Worth, Tex. $3,008,377 (contract modification). UH–1H helicopters. Aviation Materiel Command, St. Louis, Mo. DA AJ01–69–C–0028.

—**Bell Helicopter**, Fort Worth, Tex. $1,693,944. Rotary rudder booms. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–A–0022.

—**Bell Helicopter**, Fort Worth, Tex. $2,823,500. Environmental control systems for AH–1G helicopters. Aviation Materiel Command, St. Louis, Mo.

—**American University**, Washington, D.C. $1,335,000 (contract modification). Continuation of research and scientific studies. Defense Supply Service, Washington, D.C. DA HC15–67–C–0015.

9—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $10,354,000. 81mm projectile loading assembly. Marion, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0086.

—**Firestone Tire & Rubber Co., Akron, Ohio** $7,259,639 (contract modification). Leading, assembling and packing primers and 155mm artillery items. Ravenna, Ohio. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 11 173–AMC–00065 (A).

—**Raytheon Co.**, Lexington, Mass. $4,498,-DA AA09–69–C–0073; $3,312,736. Metal parts for 750-lb. bomb nose fins. Bristol, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0069.

—**Batesville Mfg. Co.**, Batesville, Ark. $3,000. 750-lb. bomb tail fuzes. Bristol, Tenn. 211,600. Metal parts for 750-lb. bomb nose fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0069.

10—**Norris Industries**, Everett, Mass. $9,150,728. 66mm rocket launchers. Brockton, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0085.

—**Ford Motors**, Wixon, Mich. $6,605,182. Trucks. Mahwah, N.J. Tank Automotive Command, Warren, Mich. DA AE07–69–C–0337.

—**Morrison-Knudson Co.**, New York, N.Y. $3,684,241. Eisenhower and Snell Locks on the St. Lawrence Seaway. Near Massena, N.Y. Engineer Dist., Buffalo, N.Y. DA CW49–69–C–0008.

—**Uniroyal, Inc.**, Detroit, Mich. $2,728,500 (contract modification). Pneumatic tires for five and ten-ton trucks. Tank Automotive Command, Warren, Mich. DA AE07–69–C–0005

—**Airport Machining Corp.**, Martin, Tenn. $1,702,255. 60mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0064.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $1,002,474. Tail boom assemblies for the AH–1G helicopter. Hurst, Tex. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–A–0022.

11—**S. S. Mullen, Inc.**, Seattle, Wash. $14,641,996. Construction of family housing at Elmendorf and Eielson Air Force Bases, Alaska. Engineer Dist., Anchorage, Alaska. DA CA85–69–C–0014.

—**General Electric**, Springfield, Mass. $2,635,263 (contract modification). Machine guns for M60 vehicles. Army Weapons Command, Rock Island Ill. DA AF03–67–C–0039.

—**Johnson Construction Co.**, Minneapolis, Minn. $1,310,770. Construction in connection with the Salamonca Flood Protection Project. Cattaraugus County, N.Y. Engineer Dist., Pittsburgh, Pa. DA CW59–69–C–0015.

—**Weatherhead Co.**, Cleveland, Ohio. $2,554,500. Metal parts for 4.2-inch projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0081.

—**Ocmet, Inc.**, Nashville, Tenn. $2,409,000. Metal parts for 4.2-inch projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0082.

—**Eureka-Williams Co.**, Bloomington, Ind. $1,015,401. Metal parts for MK 30, MOD 0, arming devices. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0067.

12—**Kennedy-Van Saun Corp.**, Danville, Pa. $6,960,800. 4.2-inch projectile metal parts. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0079.

—**Wagner Electric Corp.**, St. Louis, Mo. $4,559,500. 4.2-inch projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0078.

—**U.S. Forgecraft Corp.**, Fort Smith, Ark. $3,564,000. 4.2-inch projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0080.

—**Supreme Products Corp.**, Chicago, Ill. $1,436,800. Metal parts for 750-lb. bomb tail fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0074.

—**Stewart Warner Corp.**, Indianapolis, Ind. $1,014,160. Metal parts for 750-lb. bomb nose fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0071.

—**Olin Mathieson Chemical Corp.**, New Haven, Conn. $1,722,844. 7.62mm cartridges. Frankford Arsenal, Philadelphia, Pa DA AA25–69–C–0090.

—**Remington Arms Co.**, Bridgeport, Conn. $1,486,000. 7.62mm cartridges. Frankford Arsenal, Philadelphia, Pa. DA AA25–69–C–0088.

— **Olin Mathieson Chemical Corp.**, East Alton, Ill. $1,334,765. 7.62mm cartridges. Frankford Arsenal, Philadelphia, Pa. DA AA25–69–C–0089.

—**Seattle Stevedore Co.**, Seattle, Wash. $2,716,390. Stevedoring services at the Port of Tacoma, Wash., from Oct. 1, 1968 through Sept. 30, 1970. Western Area Military Traffic Management & Terminal Service, Oakland, Calif. DA HC23–69–D–0009.

—**Boeing Co.**, Huntsville, Ala. $1,104,288. Industrial prototypes and production engineering services on improved Hawk wings. Army Missile Command, Huntsville, Ala. DA AH01–69–C–0408.

—**Delaval Turbine, Inc.**, Trenton, N.J. $1,030,350. Turbine generator and accessories for a 33 megawatt power plant. Fort Clayton, Panama, Canal Zone. Engineer Dist., Jacksonville, Fla. DA CA17–69–C–0006.

13—**R. G. LeTourneau**, Longview, Tex. $5,980,800. Metal parts for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0044.

—**Action Mfg. Co.**, Philadelphia, Pa. $2,464,800. Metal parts for 750-lb bomb tail fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0075.

—**Delaware Valley Armaments**, Mount Laurel, N.J. $10,244,000. Metal parts for M557 fuze boosters. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0093.

—**Lear Siegler**, Anaheim, Calif. $10,364,000. Metal parts for M557 fuze boosters. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0103.

—**General Time Corp.**, Stamford, Conn. $9,805,000. Metal parts for M557 fuze boosters. Gadsden, Ala. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0094.

—**McGraw-Edison**, Bristol, Conn. $9,435,000. Metal parts for M557 fuze boosters. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0090.

—**Etowah Mfg, Co.**, Gadsden, Ala. $8,314,800. Metal parts for M557 fuze boosters. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0092.

—**Fegles Construction Co. and C&I/Girdler, Inc.**, Minneapolis, Minn. $20,000,000. Construction of a munitions plant at Newport Army Ammunition Plant, Indiana. Engineer Dist., Chicago, Ill. DA CA23–69–C–0020.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $16,278,535. OH–58A light observation helicopters and related data. Hurst, Tex. and Wichita, Kan. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–C–1699.

—**Western Electric**, New York, N.Y. $9,540,000. Radar data collection and reduction at Kwajalein Missile Range. Sentinel Systems Command, Huntsville, Ala. DA HC60–69–C–0001.

—**West Coast Machinery, Inc.**, Stockton, Calif. $6,332,837. Portable water tank trailers. Tank Automotive Command, Warren, Mich. DA AE07–69–C–0349.

—**M. M. Sundt Construction Co.**, Tucson, Ariz, $1,733,902. Construction of a parallel runway at Williams AFB, Ariz. Engineer Dist., Los Angeles, Calif. DA CA09–69–C–0037.

16—**T. L. James & Son, Inc.**, Ruston, La. $2,222,860. Channel dredging for lock and dam number 13 at the Arkansas River navigation project. Muldrow, Okla. and Fort Smith, Ark. Engineer Dist., Tulsa, Okla. DA CW56–69–C–0023.

—**Kentron Hawaii, Ltd.**, Honolulu, Hawaii. $9,777,000. Continued operation and maintenance of the technical facilities at Kwajalein Atoll. Sentinel System Command, Huntsville, Ala. DA HC60–69–C–0003.

—**American Dredging Co.**, Philadelphia, Pa. $2,065,000. Channel dredging for lock and dam number 14 of the Arkansas navigation project. Sequoyah and Le Flore Counties, Okla. Engineer Dist, Tulsa, Okla. DA CW56–69–C–0027.

—**Fairchild Space & Defense Systems**, Syosset, N.Y. $1,572,516 (contract modification). M804 cased unit assemblies with XM78 electric detonators for Shillelagh missile systems. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–67–C–0173.

—**Weatherhead Co.**, Cleveland, Ohio. $2,282,400. Parts for obturating assemblies for 4.2-inch mortars. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0101.

—**Alcan Aluminum Corp.**, Riverside, Calif. $2,327,336. Metal parts for rocket motors. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0107.

—**General Motors**, Cleveland, Ohio. $3,442,850. 155mm self-propelled howitzers. Army Weapons Command, Rock Island, Ill. DA 11–199–AMC–00610 (W).

—**Eby Construction Co.**, Wichita, Kan. $1,631,022. Dredging work at the lock and dam number 13, Arkansas River navigation project. Le Flare County, Okla. and Crawford County, Ark. Engineer Dist., Tulsa, Okla. DA CW56–69–C–0024.

17—**General Motors**, Cleveland, Ohio. $1,790,282 (contract modification). M109 (155mm) self-propelled howitzers. Army Weapons Command, Rock Island, Ill. DA 11–199–AMC–0010(W).

—**Continental Motors**, Muskegon, Mich. $2,817,230. Multi-fuel engine assemblies for five-ton trucks. Tank Automotive Command, Warren, Mich. DA AE07–69–C–0252.

—**Chrysler Corp.**, Warren, Mich. $3,177,278. Two hundred semi-trailers. Tank Automotive Command, Warren, Mich. DA AE07–69–C–0187.

18—**Firestone Tire & Rubber Co.**, Akron, Ohio. $3,325,432. T130 tract shoe assemblies for M113 personnel carriers. Noblesville, Ind. Tank Automotive Command, Warren, Mich. DA AE07–69–C–0017.

—**Hol-Gar Mfg. Corp.**, Primos, Pa. $1,086,645. Generator sets for night vision Xenon searchlights. Research and Development Equipment Command, Fort Belvoir, Va. DA AK02–67–C–0399.

—**Jackes-Evans Co.**, St. Louis, Mo. $2,739,000 (contract modification). M13 links for 7.62mm machine guns. Frankford Arsenal, Philadelphia, Pa. DA AG11–68–C–1152.

—**General Time Corp.**, LaSalle, Ill. $1,697,115. Metal parts for fuzes for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0105.

—**Gibbs Mfg. & Research Corp.**, Janesville, Wis. $1,992,600. Metal parts for fuzes for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0104.

—**Sanford Construction Co.**, Cleveland, Ohio. $2,053,210. Construction of five motel-type officers quarters and one mechanical building at Wright-Patterson AFB, Ohio. Engineer Dist., Louisville, Ky. DA CA27–69–C–0008.

19—**Norris Industries**, Vernon, Calif. $5,688,000. 105mm cartridge cases. Pico Rivera, Calif. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0056.

—**Airport Machining Corp.**, Martin, Tenn. $3,469,050. Metal parts for 2.75-inch rockets. Union, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0087.

—**Medico Industries**, Wilkes Barre, Pa. $3,090,600. Metal parts for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Dynamics**, Pomona, Calif. $11,666,844. A classified amount of Red Eye missiles. Army Missile Command, Huntsville, Ala. DA AH01–69–C–0231.

20—**Greenhut Construction Co.**, Pensacola, Fla. $3,253,900. Conversion of two buildings to BOQs. Fort Benning Ga. Engineer Dist., Savannah, Ga. DA CA21–69–C–0015.

—**General Motors**, Indianapolis, Ind. $1,039,780. Turbine assemblies for T63A5A engines for OH–6A helicopters. Aviation Materiel Command, St. Louis, Mo. DA 23–204–AMC–03262.

—**Hughes Tool Co.**, Culver City, Calif. $7,800,000. Components and spare parts for OH–6A helicopters. Aviation Materiel Command, St. Louis, Mo. DA 23–204–03697.

—**A.O. Smith Corp.**, Chicago, Ill. $31,733,540. Metal parts for 750-lb. bombs. Bellmeade, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0102.

—**UMC Industries**, Phoenix, Ariz. $2,253,000. Loading and assembling 81mm illuminating projectiles. Goodyear, Ariz. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0096.

23—**Olin Mathieson Chemical Corp.**, New York, N.Y. $72,703,775. Operation and maintenance of a GOCO facility for production of propellants, bags and related ammunition components. Charlestown, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 11–173–AMC–00097 (A).

—**Federal Cartridge Corp.**, Minneapolis, Minn. $14,162,768 (contract modification). Operation of a GOCO facility for production of small arms ammunition and support services. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 36–038–AMC–01099 (A).

—**Weatherhead Co.**, Cleveland, Ohio. $2,619,138. 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0115.

—**Ford Motors**, Highland Park, Mich. $34,377,163. Quarter-ton trucks. General Purpose Vehicle Project Manager, Warren, Mich. DA AE06–68–C–9001.

—**Chrysler Corp.**, Warren, Mich. $19,484,712. M60A1E2 combat tanks. Army Weapons Command, Rock Island, Ill. DA AF-03–69–C–0018.

—**Bell Aerospace Co.**, Fort Worth, Tex. $1,068,910. UH–1 aircraft gear box assemblies. Hurst, Tex. Aviation Materiel Command, St. Louis, Mo. DA AJ01–68–A–0022.

24—**U.S. Time Corp.**, Watertown, Conn. $10,500,000. Artillery shell fuzes. Waterbury, Conn. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0129.

—**General Motors**, Detroit, Mich. $5,312,199 (contract modification). Diesel engines for M113 vehicles. Tank Automotive Command, Warren, Mich. DA AE07–68–C–0410.

—**Ametek, Inc.**, Sheboygan, Wis. $2,452,345. Support assemblies for ammunition fiber containers. Plymouth, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09–69–C–0129.

—**General Motors**, Cleveland, Ohio. $2,036,578 (contract modification). Durability testing of AVCR–1100–3 engines for SM70 main battle tanks. Detroit, Mich. Tank Automotive Command, Warren, Mich. DA 20–113–AMC–08843.

—**Honeywell, Inc.**, Hopkins, Minn. $1,379,375 (definitization of a previously awarded letter contract). XM224 grenade fuzes. New Brighton, Minn. Army Procurement Agency, Chicago, Ill. DA AA09–68–C–0490.

—**Dresser Industries**, Columbus, Ohio. $1,000,000. Classified electronic equipment.

Electronics Command, Fort Monmouth, N.J.

25—**Hercules, Inc.,** Wilmington, Del. $26,560,696 (contract modification). Production of MK 43 grain for 2.75-inch rockets; mixed acids; and support services. Lawrence, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 11-173-AMC-00042(A).

—**Remington Arms Co.,** Bridgeport, Conn. $22,715,058 (contract modification). Production of small arms ammunition components and support services. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill. DA 49-010-AMC-3(A).

—**Olin Mathieson Chemical Corp.,** New York, N.Y. $22,090,050 (contract modification). Production of propellants and support services. Baraboo, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0014.

—**Brads Machine Products,** Gadsden, Ala. $15,440,000. Metal parts for M557 fuze components. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0147.

—**Heckethorn Mfg. Co.,** Dyersburg, Tenn. $1,808,000. Metal parts for hand grenades. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0127.

—**General Motors,** Indianapolis, Ind. $3,470,010. OH-6A and OH-58A helicopter engines. Aviation Materiel Command, St. Louis, Mo. DA AJ01-69-C-0140.

—**AVCO Corp.,** Stratford, Conn. $3,179,272. T-55 engine components; $1,296,153. T-53 engine components. Aviation Materiel Command, St. Louis, Mo. AF 41-608-67-A-3234.

—**Lear-Siegler, Inc.,** Maple Heights, Ohio. $1,102,030 (contract modification). CH-47 aircraft generators. Aviation Materiel Command, St. Louis, Mo. DA AJ01-67-D-1052.

—**Brunswick Corp.,** Sugar Grove, Va. $1,097,492 (contract modification). 35mm launchers. Edgewood Arsenal, Md. DA 18-035-AMC-0962.

26—**National Presto Industries,** Eau Clair, Wis. $13,893,750. Metal parts for M106 projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0109.

—**TRW, Inc.,** Washington, D.C. $4,978,996. Integrated technical data system. Harry Diamond Laboratories, Washington, D.C. DA 49-186-AMC-00324 (X).

—**Goodyear Tire & Rubber Co.,** Akron, Ohio. $4,894,860 (contract modification). Shoe assemblies for M48 and M60 tanks. St. Mary's, Ohio. Tank Automotive Command, Warren, Mich. DA AE07-68-C-0087.

—**Parsons Mfg. & Stamping Co.,** Cordova, Tenn. $2,912,000. 4.2-inch mortar assembly components. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0137.

—**AVCO Corp.,** Stratford, Conn. $2,096,500. UH-1 aircraft engine modification kits. Aviation Materiel Command, St. Louis, Mo. AF 41-608-67-A-3234.

—**Poorvu Construction Co.,** Waltham, Mass. $1,451,000. Construction of a laboratory support service building at the Army Natick Laboratory, Natick, Mass. New England Engineer Div., Waltham, Mass. DA CA33-69-C-0009.

27—**Western Electric,** New York, N.Y. $273,171,000. Continued research and development for the Sentinel Ballistic Missile Defense System for period of Oct. 1 1968 through July 31, 1969, and for perimeter acquisition radar hardware; $202,375,319. Sentinel production engineering and hardware. Sentinel System Command, Huntsville, Ala. DA 30-069-AMC-00333 (Y) and DA HC60-68-C-0017.

—**Stanford Research Institute,** Menlo Park, Calif. $2,069,279. Studies for the Anti-Missile-Missile System. Sentinel System Command, Huntsville, Ala. DA HC60-69-C-0004.

—**Kisco Co.,** St. Louis, Mo. $13,490,000. 105mm cartridge cases. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0043.

—**Eisen Bros.,** Lodi, N.J. $6,040,100. Metal parts for 40mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0132.

—**Amron Corp.,** Waukesha, Wis. $3,960,550. Metal parts for 40mm cartridge cases. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0144.

—**Lasko Metal Products, Inc.,** West Chester, Pa. $3,777,955. Metal parts for bomb dispensers. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0156.

—**Harvey Aluminum, Inc.,** Torrance, Calif. $3,113,415. Metal parts for 40mm cartridge cases. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0143.

—**Eastern Tool & Mfg. Co.,** Belleville, N.J. $1,606,440. Metal parts for 40mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0133.

—**AVCO Corp.,** Richmond, Ind. $1,324,965. Metal parts for 40mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0131.

—**General Plastics Corp.,** Los Angeles, Calif. $1,050,403. M564 and M565 fuze supports. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0160.

—**Kaiser Jeep Corp.,** Toledo, Ohio. $42,413,060 (contract modification). Two-and-a-half-ton trucks. General Purpose Vehicle Project Manager, Warren, Mich. DA AE06-68-C-0007.

—**Oneglia & Gervasini Construction Co.,** Torrington, Conn. $14,765,580. Construction of channels and canals, levees and flood walls pumping plants and appurtenant works for the Ansonia-Derby Local Protection Project, New Haven County, Conn. New England Div., Waltham, Mass. DA CW33-69-C-0027.

—**Ford Motors,** Dearborn, Mich. $10,500,000. Five-ton trucks. Mt. Clemons, Mich. General Purpose Vehicle Project Manager, Warren, Mich. DA AE06-68-C-0003.

—**United Ammunition Container, Inc.,** Philadelphia, Pa. $4,228,427. Artillery ammunition containers. Atlanta, Tex. Army Procurement Agency, Chicago, Ill. DA AG11-69-C-0219.

—**Ricciardi Co.,** Alpha, N.J. $4,094,625. Artillery ammunition containers. Army Procurement Agency, Chicago, Ill. DA AG11-69-C-0218.

—**General Electric,** Burlington, Vt. $1,620,000. 20mm machine guns. Army Weapons Command, Rock Island, Ill. DA AF03-69-C-0010.

—**National Cash Register Co.,** Dayton, Ohio. $1,180,000. Services and materials to mount ADP systems in Government-furnished vans. Electronics Command, Philadelphia, Pa. DA AB05-69-C-0202.

—**Raytheon Co.,** Andover, Mass. $1,112,991 (contract modification). Engineering services for the improved HAWK missile system. Army Missile Command, Huntsville, Ala. DA AH01-69-C-0099.

—**SKF Industries,** Philadelphia, Pa. $1,000,112. Roller bearings for T-53 engines used on the UH-1 aircraft. Aviation Materiel Command, St. Louis, Mo DA AJ01-69-C-0203.

30—**Philco-Ford Corp.,** Newport Beach, Calif. $13,839,799. Guidance and control equipment for Shillelagh missiles. Army Missile Command, Huntsville, Ala. DA AH01-69-C-0489.

—**Western Electric,** New York, N.Y. $20,795,000. Continued research and development on the Nike-X advanced development program; $2,898,470. Development of training courses and specifications for training devices for the Sentinel Weapon System. Sentinel System Command, Huntsville, Ala. DA HC60-69-C-0008 and DA HC60-69-C-0010.

—**Western Electric,** Greensboro, N.C. $1,174,014. Sentinel training aid devices. Sentinel System Command, Huntsville, Ala. DA HC60-68-C-0017.

—**Western Electric,** Burlington, N.C. $5,197,500. Nike Hercules improved kits. Sentinel System Command, Huntsville, Ala. DA AH01-67-A-0028.

—**Hercules Engines, Inc.,** Canton, Ohio. $13,247,639 (contract modification). Multi-fuel engine assemblies for 2½-ton trucks. Tank Automotive Command, Warren, Mich. DA AE06-68-C-0006.

—**Honeywell, Inc.,** Tampa, Fla. $4,000,000 (contract modification). Classified electronic equipment. Electronics Command, Fort Monmouth, N.J. DA AB03-69-C-01737 (X).

—**Amtron, Inc.,** Midlothian, Ill. $5,000,000. Switchboards. Electronics Command, Fort Monmouth, N.J. DA AB07-69-C-0028.

—**ITT Corp.,** Nutley, N.J. $3,566,649 (contract modification). AN/GRC-144 radio sets and antenna alignment indicators. Clifton, N.J. Electronics Command, Philadelphia, Pa. DA AB05-68-C-0027.

—**Duffers Associates,** Troy, N.Y. $1,165,772 (increment to an existing contract). Battery chargers. Poestenkill, N.Y. Electronics Command, Philadelphia, Pa. DA AB05-67-C-1676.

—**LTV Electrosystems, Inc.,** Huntington, Ind. $1,061,626 (increment to an existing contract). Vehicular radio components. Electronics Command, Philadelphia, Pa. DA AB05-67-C-0171.

—**Chamberlain Corp.,** Burlington, N.J. $5,119,714. Metal parts for 81mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0161.

—**Eastern Tool and Mfg. Co.,** Belleville, N.J. Metal parts for warheads for high explosive rockets. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0167.

—**Kennedy Van Saun Corp.,** Danville, Pa. $2,554,285 (contract modification). Metal parts for 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-68-C-0109.

—**Ensign Bickford Co.,** Simsbury, Conn. $1,019,172. M56 rocket motor igniters and M29A1 primers. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0155.

—**Harvey Aluminum Corp.,** Torrance, Calif. $1,655,162. Motor closures for M-72 rockets. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0159.

—**Carter Carburator,** St. Louis, Mo. $3,467,325. M52 fuze bodies for 60mm projectiles. Olivette, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill. DA AA09-69-C-0145.

—**General Electric,** Burlington, Vt. $10,885,770. 20mm self-propelled guns. Army Procurement Agency, New York, N.Y. DA AG25-69-C-0346.

—**Temco, Inc.,** Nashville, Tenn. $1,367,604. M8 fin assemblies for 106mm projectiles. Army Procurement Agency, Chicago, Ill. DA AG11-69-C-0224.

—**Norris Industries,** Los Angeles, Calif. $2,597,963 (contract modification). 105mm cartridge cases. Army Procurement Agency, Los Angeles, Calif. DA AG07-69-C-0035.

—**Highland Industries,** Kansas City, Mo. $1,134,629 (increment to an existing contract). Tank and pump units for petroleum trucks. Mobility Equipment Command, St. Louis, Mo. DA AK01-67-C-B257.

DEPARTMENT OF THE NAVY

3—**Detyens Shipyard,** Mt. Pleasant, S.C. $1,283,822. Overhaul and alteration of the USNS Private Jose F. Valdez. Military Sea Transportation Service.

—**Lockheed Aircraft,** Sunnyvale, Calif. $1,237,000. Poseidon advanced guidance system. Strategic Systems Project Office. N00030-69-C-0100.

4—**Collins Radio Co.,** Richardson, Tex. $7,199,932. Eight marine technical data systems. Naval Electronic Systems Command. N00039-69-C-3506.

—**Quality Pacific, Ltd.,** Honolulu, Hawaii. $1,984,705. Construction of an advanced technical support facility and modernization of a ship repair facility at the Naval Submarine Base, Pearl Harbor, Hawaii. Naval Facilities Engineering Command.

—**E. C. Ernst, Inc.,** Norfolk, Va. $1,893,834. Installation of utilities at Piers 2, 3, and 4 at the Naval Station, Norfolk, Va. Naval Facilities Engineering Command. N62470-68-C-0532.

—**North American Rockwell Corp.,** Anaheim, Calif. $1,509,000. Operation and maintenance of ships inertial navigation systems equipment for one year. Naval Ship Systems Command. N00024-69-

C–5110.

—**Horne-Zwick Construction Co.**, Suisun City, Calif. $1,182,000. Construction of a BOQ and mess hall at the San Francisco Bay Naval Shipyard, Hunters Point Div., San Francisco, Calif. Naval Facilities Engineering Command. N62474–67–C–0737.

5—The following modifications to fixed price contracts have been made by the Naval Air Systems Command for contract definition phase of the VFX weapon system:

Grumman Aircraft Engineering Corp., Bethpage, N.Y. $1,000,000. N00019–69–C–0053.

LTV Aerospace Corp., Dallas, Tex. $1,000,000. N00019–69–C–0052.

General Dynamics, San Diego, Calif. $1,000,000. N00019–69–C–0047.

North American Rockwell Corp., El Segundo, Calif. $1,000,000. N00019–69–C–0048.

McDonnell Douglas Corp., St. Louis, Mo. $1,000,000. N00019–69–C–0051.

—**Pasco Steel Corp.**, Pomona, Calif. $1,988,398. Procurement of 60 units of pontoons for the Construction Battallion Center, Port Hueneme, Calif. Naval Facilities Engineering Command. N62473–69–C–0004.

—**United Aircraft**, East Hartford, Conn. $1,832,400. JT3D–3B engines. Naval Air Systems Command. N00019–68–C–0472.

—**Bethlehem Steel**, Boston, Mass. $1,975,503. Topside overhaul work on the oiler USS Mississinewa (AO–144). Supervisor of Shipbuilding, Conversion and Repair, First Naval Dist., Boston, Mass.

6—**Westinghouse Electric**, Baltimore, Md. $15,484,800. AN/APG–59 radar sets. Naval Air Systems Command. N00019–68–C–0570.

—**Goodyear Aerospace Corp.**, Akron, Ohio. $12,636,395. Production of Subroc missiles Naval Ordnance Systems Command. N00017–69–C–1407.

—**General Precision Systems**, Glendale, Calif. $1,400,000. Increased production of MK48 torpedo fire control system modification kits. Naval Ordnance Systems Command. N00017–68–C–1218.

—**PRD Electronics**, Jericho, N.Y. $1,043,521 (contract modification). To increase the limitation of authorization for VAST systems and associated ancillary items. Naval Air Systems Command. N00019–67–C–0481.

9—**Dow Chemical Co.**, Midland, Mich. $11,140,411. AM–2 airfield landing mats. Enterprise, Ala. and Madison, Ill. Naval Air Engineering Center, Philadelphia, Pa. N00156–69–C–0689.

—**Norris Industries**, Los Angeles, Calif. $3,211,200. Eight-inch 55-cal. brass cartridge cases. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0042.

—**Raytheon Co.**, Lowell, Mass. $1,698,600. Sparrow Three missile modification kits. Oxnard, Calif. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–67–A–0006.

—**Hughes Aircraft**, Culver City, Calif. $1,492,122. Electronic warfare sub-system research. Office of Naval Research.

—**Western Electric**, New York, N.Y. $1,095,615. Production of Tartar weapons direction equipment. Burlington, N.C. Naval Ordnance Systems Command. N00017–68–C–2310.

10—**Boeing Co.**, Morton, Pa. $7,058,000 (contract modification). Long lead time requirements for FY69 procurement of CH–46 helicopters. Naval Air Systems Command. N00019–68–C–0391.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $5,000,000 (contract modification). Long lead time effort and materials to support modification of aircraft to a multi sensor configuration. Naval Air Systems Command. N00010–68–C–0055.

—**Sperry Rand Corp.**, Syosset, N.Y. $3,147,370. Computer components, repair parts and technical data. Naval Ship Systems Command. N00024–69–C–5100.

11—**Fairchild Camera & Instrument Corp.**, Syosset, N.Y. $1,267,438. Fuze bases for 5-inch, 38-cal. projectiles. Copiague, N.Y. Navy Ships Paris Control Center, Mechanicsburg, Pa. N00104–69–C–0034.

—**United Aircraft**, East Hartford, Conn. $1,041,810. J–48 engine blades for F–9 aircraft. Aviation Supply Office, Philadelphia, Pa. N00383–9–6900A–AF673.

12—**American Mfg. Co. of Tex.**, Fort Worth, Tex. $8,250,000. Five-inch, 54-cal. ammunition. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0036.

—**Sperry Rand Corp.**, Great Neck, N.Y. $6,931,550. Increased production of AN/SPG–55B Terrier radar sets. Naval Ordnance Systems Command. NOw 66–0537F.

—**Collins Radio Co.**, Newport Beach, Calif. $2,483,997. Manufacture of generators and ancillary equipment. Naval Electronic Systems Command. N00039–69–C–2513.

—**General Dynamics**, Pomona, Calif. $2,289,057. Research and development on the Standard Arm missile. Naval Air Systems Command. N00019–68–C–0400.

—**United Aircraft**, East Hartford, Conn. $1,688,127. J60P3A/P6 engine spare parts. Aviation Supply Office, Philadelphia, Pa. N00383–9–95800A–AA298.

—**United Aircraft**, East Hartford, Conn. $1,207,545. Spare parts to support J57 engines on F8, A3, A6 and A4 aircraft. Aviation Supply Office, Philadelphia, Pa. N00383–9–69–000A–AF691.

—**General Dynamics**, Groton, Conn. $1,000,000. Advance planning and design work for the nuclear powered fleet ballistic missile submarine USS George Washington (SSBN–598). Naval Ship Systems Command. N00024–69–C–0235.

13—**Sanders Associates**, Nashua, N.H. $2,409,570. H. F. bandsweeping receivers. Naval Electronic Systems Command. N00039–68–C–2508.

—**Lockheed Aircraft**, Sunnyvale, Calif. $1,817,143. Advanced engineering studies for Poseidon. Strategic Systems Project Office. N00030–69–C–0108.

—**Hughes Aircraft**, Fullerton, Calif. $7,459,236. Radar sets, components and engineering services. Naval Ship Systems Command. N00024–69–C–1005.

—**EDO Corp.**, College Point, N.Y. $3,695,863. Long-range detection and tracking sonar equipment. Naval Ship Systems Command. N00024–69–C–1029.

—**Newport News Shipbuilding & Dry Dock Co.**, Newport News, Va. $1,995,000. Design and furnish nuclear propulsion components. Naval Ship Systems Command. N00024–68–C–0268.

17—**Metals Engineering Corp.**, Greenville, Tenn. $13,428,454. MK 82, MOD 1, conical bomb fin assemblies. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0066.

—**North American Rockwell Corp.**, Columbus, Ohio. $8,198,903 (contract modification). Incremental funding for Phase II engineering development of the Condor missile system. Naval Air Systems Command, NOw 66–0728.

—**FMC Corp.**, Minneapolis, Minn. $7,673,109. Production of 5"/54 gun mounts and related equipment. Naval Ordnance Systems Command. N00017–68–C–4211.

—**Campbell Co. and General Contractors**, Tyler, Tex. $7,534,230. Construction of barracks, mess hall, utilities and heating plant. Marine Corps Base, Camp Le Jeune, N.C. Naval Facilities Engineering Command. N62470–68–C–0016.

—**United Aircraft**, Hartford, Conn. $4,785,982. Design, fabrication and test of the JTF10A–32C engine. Naval Air Systems Command. N00019–69–C–0120.

—**All American Engineering Co.**, Wilmington, Del. $3,121,000. Spare parts for land-based arresting gear. Naval Air Engineering Center, Philadelphia, Pa. N00–156–69–C–0611.

—**United Aircraft**, Hartford, Conn. $2,018,488. Spare parts to support J52/57/34/36/36A aircraft engines. Aviation Supply Office, Philadelphia, Pa. N00383–9–69–000A–AF704.

—**Petersen Construction Co.**, Lakeland, Fla. $2,728,004. Improvement of the sewage treatment plant. Marine Corps Base, Camp Lejeune, N.C. Naval Facilities Engineering Command. N62470–68–C–0547.

—**Aero Corp.**, Lake City, Fla. $2,021,200. Progressive aircraft rework on P–2 aircraft. Naval Air Systems Command. N00019–69–C–0136.

—**Gulf Construction Building & Supply Co.**, Mobile, Ala. $1,476,600. Construction of 100 family housing units. Naval Auxiliary Air Station, Whiting Field, Milton, Fla. Naval Facilities Engineering Command. N62467–67–C–0751.

—**Virginia Electronics Co.**, Falls Church, Va. $1,112,057. Manufacture of Romeo Eight secure voice networks. Naval Electronics Systems Command. N00039–68–C–1571.

—**Hughes Tool Co.**, Culver City, Calif. $1,085,464. Repair parts for 20mm, MK 4, gun pods. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–67–A–0006–209.

18—**Lockheed Aircraft**, Burbank, Calif. $4,380,000 (contract modification). Change of P–3B aircraft to YP–3C configuration. Naval Air Systems Command. N00019–68–C–0043.

—**Lockheed Aircraft**, Marietta, Ga. $1,740,000 (contract modification). Increase the limitation of authorization for EC–130 aircraft. Naval Air Systems Command. N00019–67–C–0266.

—**General Electric**, Syracuse, N.Y. $2,793,052. Mine detecting/classifying sonar sets. Naval Ship Systems Command. N00024–69–C–1055.

—**Lansdowne Steel & Iron Co.**, Morton, Pa. $2,008,000. MK 50, MOD 0, projectiles for five-inch guns. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0057.

—**Jacobsen Construction Co.**, Salt Lake City, Utah. $1,757,000. Construction of 100 family housing units at the Naval Ammunition Depot, Hawthorne, Nev. Naval Facilities Engineering Command. N62474–67–C–1158.

—**Philco Ford Corp.**, Fort Washington, Pa. $1,623,411. Furnishing of supplies and services to refurnish and improve ship-board sonar equipment. Naval Ship Systems Command. N00024–68–C–1132.

—**General Electric**, West Lynn, Mass. $1,063,920. ASN26 flight reference system components. Aviation Supply Office, Philadelphia, Pa. N00383–67–A–1101–0290.

19—**Collins Radio Co.**, Newport Beach, Calif. $6,474,999. Production of generators and ancillary equipment. Naval Electronic Systems Command. N00039–68–C–3507.

—**Webb Corp.**, Phoenix, Ariz. $5,885,143. Construction of 330 family housing units at the Marine Corps Air Station, Yuma, Ariz. Naval Facilities Engineering Command. N62473–67–C–3174.

—**Continental Heller Corp.**, Sacramento, Calif. $4,277,000. Construction of an aircraft maintenance hanger at the Naval Air Station, Lemoore, Calif. Naval Facilities Engineering Command. N62474–67–C–0725.

—**Deep South Construction Co.**, Montgomery, Ala. $3,189,000. Construction of an outlying field at the Naval Air Station, Meridian Miss. Naval Facilities Engineering Command. N62467–67–C–0560.

—**Trader Construction Co.**, Havelock, N.C. $1,342,500. Construction of a mess hall at the Marine Corps Air Station, Cherry Point, N.C. Naval Facilities Engineering Command. N62470–8–C–0082.

20—**Canadian Commercial Corp.**, Ottawa, Ontario, Canada. $17,112,445. Twin power section turboshaft engines for AH–1J and UH–1H helicopters. Naval Air Systems Command. N00019–69–C–0125.

—**Poloran Products**, New Rochelle, N.Y. $13,326,455. MK 82, MOD 1, conical bomb fin assemblies. Batesville, Minn. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0084.

—**Straightline Mfg. Co.**, Cornwells Heights, Pa. $13,293,816. MK 82, MOD 1, conical bomb fin assemblies. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0083.

—**General Motors**, Goleta, Calif. $2,241,563. Incremental funding to establish design, development, test proof and qualification of a warhead and exploder for MK 48, MOD 0, torpedoes. Naval Ordnance Systems Command. N00017–67–C–1218.

—**Automated Terminal Services**, Jamaica, N.Y. $1,861,888. Freight terminal operations for the QUICKTRANS program. Navy Purchasing Office, Washington, D.C. N00600–69–C–0264.

24—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $14,800,000 (contract modification). FY 1969 long lead time effort for A–6A aircraft. Naval Air Systems Command. NOw 66–0058.

—**R. G. Webb, Inc., and Compac Construction Co.**, Long Beach, Calif. $3,880,000. Construction of family housing at the Naval Station, Long Beach, Calif. Southwest Div, Naval Facilities Engineering

Command, San Diego, Calif. N62473–67–C–3175.

—**Harrison Overseas Corp.**, Miami, Fla. $2,284,000. Construction of a BOQ with mess at the Naval Base, Guantanamo Bay, Cuba. Caribbean Div., Naval Facilities Engineering Command, San Juan, Puerto Rico. NBy–84195.

—**Newport News Shipbuilding & Dry Dock Co.**, Newport News, Va. $1,500,000. Advance planning design, and other work preparatory to conversion of the nuclear powered fleet ballistic missile submarine USS Sam Rayburn (SSBN–635) to C–3 Poseidon missile capability. Naval Ship Systems Command. N00024–69–0231.

—**General Precision Systems**, Glendale, Calif. $1,444,528. Engineering services to provide technical assistance during evaluation of MK 48 torpedo weapons systems. Naval Ordnance Systems Command. N00017–69–C–1201.

—**ESB, Inc.**, Raleigh, N.C. $1,346,575. Production of MK 37 torpedo batteries. Naval Ordnance Systems Command. N00017–69–C–1408.

—**Kellett Aircraft Corp.**, Willow Grove, Pa. $3,776,256. Transportable calibration complexes for use in support of test and measuring equipment in the Fleet Marine Force. Headquarters, Marine Corps. M00027–69–C–0040.

25—**McDonnell Douglas Corp.**, Long Beach, Calif. $4,500,000 (contract modification). Long lead time effort and materials to support FY 1969 procurement of A–4 and AT–4 aircraft. Naval Air Systems Command. N00019–67–C–0170.

—**RCA**, Camden, N.J. $2,224,223 (contract modification). Operations and maintenance of instrumentation at the Atlantic Fleet Range Support Facility for a twelve-month period. Naval Air Systems Command. N00019–67–C–0341.

—**Hayes Construction Co.**, Brunswick, Ga. $1,537,476. Construction of an air traffic control school training building at the Naval Air Station, Glynco, Ga. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C. N62467–67–C–0460.

—**Newport News Shipbuilding & Dry Dock Co.**, Newport News, Va. $1,500,000. Advance planning, design and preparatory work in the C–3 Poseidon missile conversion of the fleet ballistic missile nuclear powered submarine USS Tecumseh (SSBN–628). Naval Ship Systems Command. N00024–69–C–0215.

26—**General Dynamics**, Pomona, Calif. $24,016,020. FY 1969 funding for production of medium range standard missiles and extended range standard missiles. Naval Ordnance Systems Command. N00017–67–C–2107.

—**Westinghouse Electric**, Baltimore, Md. $2,500,000. Production of materials and effort necessary to furnish complete production prototype models of Special Exercise Sections (Techeval) and (Opeval) for MK 48 torpedoes. Naval Ordnance Systems Command. NOw (H) 64–0751.

—**Sparton Corp.**, Jackson, Mich. $1,557,280. Sonobuoys. Naval Air Systems Command. NOw 66–0652.

27—**Maxon Electronics Corp.**, Macon, Ga. $5,989,900. Base fuses for the 5-inch 38-cal. loading program. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0041.

—**General Motors**, Milwaukee, Wis. $4,084,000. Time fuses for 5-inch 54-cal. loading program. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0087.

30—**Norris Industries**, Los Angeles, Calif. $3,407,500. MK 16, MOD 1, rocket tubes for 5-inch Zuni rockets. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0097.

—**Columbus Milpar Mfg. Co.**, Columbus, Ohio. $3,143,000. Nozzle and fin assemblies for 5-inch Zuni rockets. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0090.

—**General Precision Systems**, Little Falls, N.J. $2,266,722. Equipment for the ASN–84 navigational system used by P–3C aircraft; $2,002,469. Equipment for ASN–84 navigational systems. Aviation Supply Office, Philadelphia, Pa. N00383–68–A–3201–0059 and N00383–68–A–3201–0058.

—**Alcan Aluminum Co.**, Riverside, Calif. $1,760,850. MK 16, MOD 1, rocket motor tubes for 5-inch Zuni rockets. Navy Ships Parts Control Center, Mechanicsburg, Pa. N00104–69–C–0092.

DEPARTMENT OF THE AIR FORCE

4—**Honeywell, Inc.**, Hopkins, Minn. $2,852,880. Production of metal parts kits for aerial bombs. Armament Development and Test Center. F33657–69–C–0265.

—**National Lead Co.**, Toledo, Ohio. $1,443,280. Production of metal parts kits for aerial bombs. Armament Development and Test Center. F33657–69–C–0266.

—**Boeing Co.**, Wichita, Kan. $18,921,593. Modification of B–52 aircraft to improve the flight control systems. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.,

5—**Superior Steel Ball Co.**, New Britain, Conn. $2,131,661. Production of non-explosive munition components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–69–C–0311.

—**General Motors**, Indianapolis, Ind. $1,250,000. Development work on an advanced turbine-engine gas generator. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–0363–P003.

—**ITT Corp.**, Nutley, N.J. $1,177,029. Production of spare parts for a radio navigational system. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F33657–67–C–0524.

—**LTV Electrosystems, Inc.**, Greenville, Tex. $1,477,650. Modification of prototype EC–121T aircraft. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F04606–69–C–0127.

6—**Garrett Corp.**, Phoenix, Arix. $2,393,693. Production of gas turbine engines. Oklahoma City Air Materiel Area. (AFLC), Tinker AFB, Okla. F34601–68–C–3886.

—**General Electric**, Utica, N.Y. $8,629,500 (increment to an existing fixed-price contract). Production of airborne electronic counter measure equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–0664 P009.

—**Chicago Aerial Industries**, Barrington, Ill. $2,113,023. KS–87B camera systems. Aeronautical Systems Div., (AFSC), Wright-Paterson AFB, Ohio. F33657–67–C–0243 P017.

—**Bendix Corp.**, North Hollywood, Calif. $7,674,783. Production of airborne radar equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–67–C–0367 P011.

9—**Rand Corp.**, Santa Monica, Calif. $12,000,000. Studies and research on aerospace power. Office of Scientific Research, Washington, D.C. F44620–67–C–0045.

—**Bendix International**, New York, N.Y. $2,868,164. Radar sets. Towson, Md. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif. F4606–69–C–0301.

—**Raytheon Co.**, Waltham, Mass. $1,950,750. Electron tubes. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F09603–68–A–0327–0002.

—**Analytical Services**, Falls Church, Va. $1,50,000. Analytical studies pertaining to the application of weapons systems. Office of Scientific Research, Washington, D.C. F44620–69–C–0014.

—**Philco-Ford Corp.**, Fort Washington, Pa. $1,393,708. Operation, maintenance and modification of large aperture seismic array facilities. Billings and Miles City, Mont. Electronics Systems Command, (AFSC), L. G. Hansom Field, Mass. F19628–68–C–0401.

11—**Crescent Precision Products**, Garland, Tex. $4,691,568. Production of bomb components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–0840.

—**Chromalloy American Corp.**, San Antonio, Tex. $1,612,263. Repair and application of protective metallic coating on J57 and J75 compressor blades. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. F41608–68–D7 1617–0008.

13—**Hoffman Electronics Corp.**, El Monte, Calif. $2,136,875. Production of air navigation equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–0195.

16—**ITEK Corp.**, Palo Alto, Calif. $6,127,743. Production of components and assorted ground equipment in support of AN/APR–25 and 26 radar and warning systems; and components for AN/APR 736/37 radar systems. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. FO4606–67–A–1818.

—**Hayes International Corp.**, Birmingham, Ala. $4,539,167. Production of aerial tow targets. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F41608–68–A–6576.

—**Aerodex, Inc.**, Miami, Fla. $7,636,218. Overhaul of R4360 aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. F41608–69–D–9245.

17—**Sargent-Fletcher Co.**, El Monte, Calif. $5,235,161. Production of fuel tank assemblies for F–4 and RF–4 aircraft. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F42600–69–D–0226 0001.

—**United Aircraft**, Hartford, Conn. $1,999,837. Production of spare parts for J–57 aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex. N393–69–000A.

19—**AiResearch Mfg. Co.**, Phoenix, Ariz. $1,258,444. Overhaul of gas turbine engines. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F34601–68–D–4328.

—**Thiokol Chemical Corp.**, Huntsville, Ala. $1,875,509. Motors for the Athena H missile program. Space & Missile Systems Organization, (AFLC), Los Angeles, Calif. F04701–68–C–0182.

20—**Boeing Co.**, Wichita, Kan. $3,236,406. Services to accomplish depot level modification on B–52 aircraft for FY 69. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F34601–68–C–4653.

—**North American Rockwell Corp.**, Tulsa, Okla. $7,401,000. Inspection and repair of air-to-ground missiles. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F34601–68–C–0082.

23—**Batesville Mfg. Co.**, Camden, Ark. $2,160,000. Bomb components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33665–69–C–1071.

—**Aerojet-General Corp.**, Sacramento, Calif. $1,659,000. Production of components for the Genie rocket. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F04606–68–A–0068–QP11.

—**McDonnell-Douglas Corp.**, Long Beach, Calif. $1,500,000. A model ejection seat development program. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–69–C–0223.

—**General Electric**, Bethesda, Md. $1,118,600. Rental of electronic data processing equipment. Procurement Div., Offutt AFB, Neb. F25600–69–M–1628.

24—**Honeywell, Inc.**, Hopkins, Minn. $9,984,000. Production of bomb components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio F33657–69–C–0291.

—**Litton Systems, Inc.**, Woodland Hills, Calif. $1,667,539. Production of aerospace ground equipment for the inertial navigation system applicable to the RF–4 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–67–C–1526–0004.

—**Perkin-Elmer Corp.**, Norwalk, Conn. $1,350,000. Production of a camera system for the RA–5C aircraft. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah. F42600–69–C–0339.

25—**Fairchild Hiller Corp.**, Germantown, Md. $6,000,000 (contract modification). Repair and modification of C–119 aircraft. F09603–68–C–1633 POOD 0048 & 0049. Warner Robins Air Materiel Area. (AFLC), Robins AFB, Ga.

—**Aero Corp.**, Lake City, Fla. $3,798,922. Maintenance and modification of C–124 aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F09603–

69–C–0027.

—**Marwais Steel Co.**, Richmond, Calif. $2,484,390. Production of aircraft revetments. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F09603–69–C–0738–P001.

—**Cullman Metalcraft**, Cullman, Ala. $2,771,613. Production of bomb components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33615–69–C–0167.

—**Cessna Aircraft Co.**, Wichita, Kan. $3,500,000. Engineering and modification services, spare parts and data for 0–2A aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–1224.

26—**United Aircraft**, East Hartford, Conn. $1,210,386. Production of spare parts for J57 aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

27—**General Electric**, Philadelphia, Pa. $3,700,000 (increment to a previous contract). Research and development of MK 12 re-entry systems. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. AF 04–(694)–731.

—**Hayes International Corp.** Birmingham, Ala. $3,133,237. Maintenance and modification of C–124 aircraft .Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga. F09603–69–C–0028.

30—**United Aircraft**, Windsor Locks, Conn. $4,717,704. Production of payload transports for Minuteman II and III missiles. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif. F04701–68–C–0156.

—**Texas Instruments**, Dallas, Tex. $2,846,672 (increment to an existing contract). Manufacture of components for infared detecting sets for RF–4C aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio. F33657–68–C–0379–P004.

—**AiResearch Mfg. Co.**, Phoenix, Ariz. $2,000,000. Gas turbine engines. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F34601–69–D–0803.

—**Collins Radio Co.**, Cedar Rapids, Iowa. $1,298,994. Engineering, fabrication and installation of modification kits for an improved avionics system for VC–137 aircraft. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla. F34601–68–A–2513.

—**Mitre Corp.**, Bedford, Mass. $19,455,570. Research and development for system design, engineering, inter-system integration, and research and experimentation to achieve continuing advances in the field of information and communication systems. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass. F19628–68–C–0365.

Standardization Documents

(Continued from page 23)

tors of the responsibility for application of specifications of appropriate date in complying with defense contracts.

Subscription requests for new and revised specifications and standards may be forwarded to the Director, Navy Publications and Printing Service Office, Building 4, Section D, 700 Robbins Ave., Philadelphia, Pa. 19111. Each request should be accompanied by a certified bank check or postal money order, payable to the Treasurer of the United States, covering an annual subscription by class computed at $4.50 for each class the subscriber desires.

Distribution will be made of copies in printed form. Subscribers will receive only new or revised documents printed after the effective date of the subscription. Documents printed prior to an effective subscription date must be ordered on an individual document basis, using DD Form 1425. New and revised specifications and standards are automatically distributed to subscribers within five days of receipt at NPFC Philadelphia.

General Information

Some other points of information, concerning the distribution of specifications and standards from NPFC Philadelphia, are:

- Current amendments and revisions will be automatically issued with the basic specifications requested.
- Only documents requested by number will be furnished. Referenced documents must be requested by individual document number, when required for contract execution.
- Slash sheets, such as MIL–E–1/306B, must be individually requested by document number.
- Industry standards should be ordered from the preparing technical societies, not NPFC Philadelphia.
- NPFC Philadelphia stocks only those specifications and standards listed in the DODISS.
- NPFC Philadelphia does not maintain a file for invitations for bid, requests for quotes, contracts, etc., so a list of each individual document required by document symbol must be submitted.
- Documents issued by NPFC Philadelphia are in printed form only.
- Only latest issues of specifications and standards listed in the DODISS will be furnished.
- Canceled (or superceded) specifications are not stocked at NPFC Philadelphia. Copies of canceled documents required in fulfillment of contractual obligations may be obtained from the Director, Navy Publications and Printing Service Office (NPPSO–4ND), Philadelphia, Pa. 19111, upon certification of the need by the applicable contracting officer.

To expedite deliveries of material to customers, a mechanized material warehousing and packing system is used. NPFC Philadelphia has approximately one and one-half miles of mechanized conveyor which is monitored by a programmer from an electronic console. Through this console the programmer regulates an even flow of work to and from all operating areas.

Every effort is made to provide maximum service to private industry and to satisfy each and every customer.

FX–VFX Engine Contracts Awarded

Contracts totaling $100 million in value have been awarded by the Air Force for initial development of a high performance afterburning turbofan engine suitable for use by the Air Force FX air superiority fighter and the Navy VFX advanced fighter.

Letter contracts and initial obligations of $11 million each have been given to the Pratt and Whitney Division, United Aircraft Corp., Palm Beach, Fla., and the General Electric Co., Evendale, Ohio.

Under terms of the contract, each company will develop and test a prototype engine based on the technological level demonstrated by the lift/cruise engine development program.

The 18-month initial engine development program is jointly funded by the Navy and the Air Force.

The FX program is under the direction of Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio. Colonel Robert White is the program director.

Changing Address?

The *Defense Industry Bulletin* converted to a computer-prepared mailing list a few months ago. Now, when requesting a change in address or a deletion, subscribers must send the mailing label from the back cover of the magazine. Without this label, changes in address or deletions cannot be effected. Changes and labels should be sent to the Editor, Defense Industry Bulletin, OASD (Public Affairs), Room 1E764, The Pentagon, Washington, D.C. 20301.

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Fly-by-Wire System Tested by Air Force Systems Command

"Fly-by-wire?" No, it is not a circus trapeze act. It is actually a unique and reliable way to fly fast modern aircraft that is now under study by the Air Force.

The system is based on the use of electrical and electronic signal wires in place of mechanical links between a pilot's stick and control surface actuators.

Test flights of the system are being conducted by the Air Force Systems Command's Flight Dynamics Laboratory at Wright-Patterson AFB, Ohio. First phase of the program, consisting of test flights of a single-axis (pitch) fly-by-wire system on a B–47 aircraft, has already been successfully completed.

The fly-by-wire system is installed parallel with the aircraft's mechanically operated system. A non-redundant servo-operated hydraulic actuator is connected to the elevator of the B–47, and receives electrical signals from position transducers connected to the pilot's control stick.

A pilot has the same sense of feel when flying the B–47 fly-by-wire control system as he does when using a mechanical linkage system, since he is connected to the same artificial feel system. The mechanical system is not disconnected, but is used as a safety back-up. In the fly-by-wire mode the mechanical system is bypassed, and the electrically controlled servo actuator operates the elevator.

Purpose of the testing program is to develop a control system that can meet the demands of advanced vehicles. Mechanical linkages, cables and feel springs, that are part of a manual system, cannot adequately handle control problems of advanced high performance aircraft and aerospace vehicles. The fly-by-wire system increases flexibility and reliability of aircraft controls as well as decreasing its complexity, weight, volume and cost.

The second phase of the program calls for the aircraft to be equipped with a side-stick controller for the pilot, with a closed loop feedback system so that the pilot directly controls movements of the aircraft and has the necessary feel-response from the controls.

Army Lab Gets New Nuclear Research Capability

A $4 million Tandem Van de Graaff Accelerator, the only nuclear research tool of its kind with the U. S. defense establishment, is now operational at the Army Nuclear Defense Laboratory, Edgewood Arsenal, Md.

The laboratory will use the new accelerator to conduct both basic and applied research. The new facility can accelerate a wide range of nuclear particles to energies at which nuclear reactions can be studied.

Under construction since July 1967, the accelerator was built by the High Voltage Engineering Corp., Burlington, Mass. Its shelter was provided by Henry A. Knott, Inc., Baltimore, Md.

The Nuclear Defense Laboratory conducts research in nuclear weapons effects including initial radiation, residual radiation and fallout, shielding, and thermal radiation phenomena. Formerly under direct administrative control of the Army Materiel Command, the laboratory now reports to the Research and Development Center, Aberdeen Proving Ground, Md. Dr. Donald Eccleshall is acting technical director of the laboratory.

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